# GYPSUM BOARD

## *A Key To A Quieter Home!*

Today's homeowners are demanding effective sound control capabilities from their new and remodeled homes. As the excessive noise of our automated society rises, so do the concerns of consumers, who want their homes to be a haven from noise produced outside and within the home. For example, rising population densities, and the ever-growing level of noise from traffic, sirens, and the multitude of household appliances place a premium on sound control. Often, even normal conversations can be heard from room to room through thinly constructed walls; but at the end of a hectic day who wants to retreat home to a house full of unwanted noise?

■ *Improved sound control can be achieved when a home's interior walls and ceilings are finished with multiple layers of gypsum board.*

**Noise from lawn mowers, traffic, etc., is reduced when gypsum board is used on exterior walls and ceilings. Unwanted noise from TVs, radios, and distracting conversations is also dramatically reduced or eliminated when gypsum board is used on interior partitions and ceilings.**

Fortunately, more and more builders are addressing the demand by consumers for improved sound construction. New construction is beginning to reflect this change in attitude through the incorporation of noise control construction techniques designed to reduce the quantity, and volume, of noise that is transmitted through walls, ceilings, and structural elements. Many builders and designers are already aware of the added value and benefits of upgrading from the bare minimum requirements of the building codes.

Gypsum board, or drywall, a familiar and versatile building material, is being used increasingly to control noise and reduce sound transmission. One of the best values in any economy, gypsum board represents about 3% of the total cost of a home while providing about 80% of the visible interior. There is no need to skimp on this cost-effective building material when a modest additional amount can render appreciable benefits. These benefits include enhanced fire resistance, improved long-term durability, and added sound attenuation. Additionally, gypsum board sound control upgrades can enhance builder profits and play a positive role in a builder's image and brand identity.

■ *Gypsum board area separation walls used in multi-family and townhouse construction provide a high degree of sound isolation.*

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Sound is generated by vibrations resulting in what are commonly referred to as “sound waves.” Sound waves can be airborne, structure-borne, or a combination of both. Airborne sound travels in the form of waves through the air such as those generated by speech or the whistle of a kettle. Structure-borne sound is created when a wall or floor is made to vibrate by direct contact with a mechanical device, such as a stereo speaker, washing machine, or footstep.

Perhaps the most common type of noise is a combination of airborne and structure-borne. For example, a stereo speaker emits airborne sound and the speaker cabinet can be set in motion as the speaker reverberates, causing the floor to vibrate. The vibrating floor then transmits the sound to other rooms and floors in the same building. Airborne sound also travels around walls and through “flanking paths” such as doors, windows, and electrical boxes.

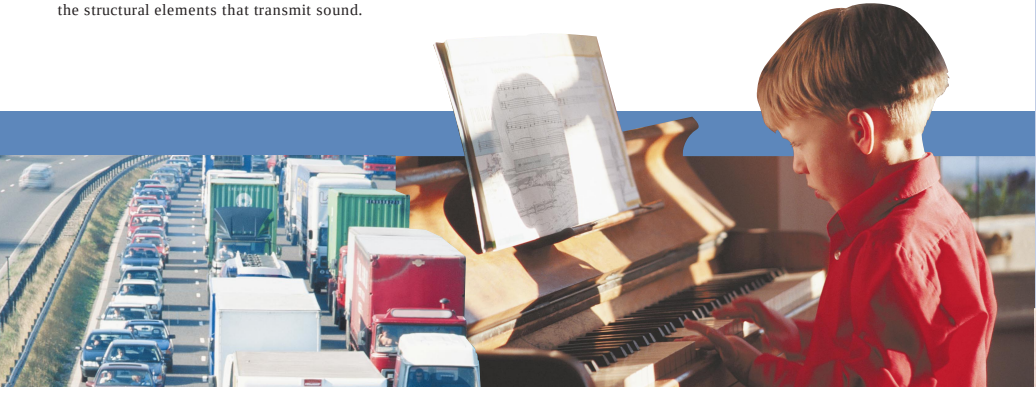
*An existing home can be made more liveable through improved sound control. This is a natural for new rooms or upgrading of basements, garages, or attics into new living space.*

## The additional thickness, density, and weight of 5/8" gypsum board over 1/2" gypsum board is extremely beneficial in attaining improved sound control.

The amount of sound transmission that is eliminated by a wall, or floor and ceiling, is stated numerically as an “STC rating” (sound transmission class). The higher the STC rating, the more effective is the system’s sound-controlling abilities. An STC of over 50 is considered very good. An average partition wall constructed of 2 x 4 wood studs and one layer of 1/2" regular gypsum board applied to each side has an STC of around 30. However, higher STCs can be achieved by adding an extra layer of easy-to-install gypsum board. The construction details shown on the back of this brochure illustrate that it is not difficult to achieve an STC of 50 or higher with gypsum board construction.

A combination of materials is best to reduce noise levels because sound is made up of a wide variety of frequencies. Various frequency ranges are best controlled by particular construction methods. Some frequencies are best controlled by additional insulation; others are better controlled by the additional mass of gypsum board; others may be more effectively controlled by decoupling the structural elements that transmit sound.

*The trend to in-home offices and home entertainment rooms is creating a more sound control conscious consumer.*



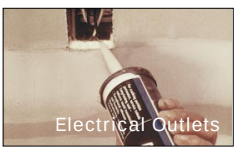
Adding mass to walls in the form of gypsum board, filling the wall cavity with insulation, and decoupling one side of the wall using resilient channels or staggered studs, provide the essentials for an effective sound control wall system. For reasons of cost, disruption, and effectiveness, it is best to specify the design of the sound control system during the design phase of new homes or major renovations.

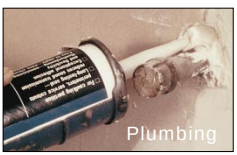
For any sound control system, high quality construction practices must be followed to ensure the system performs as intended. For example, sealing all gaps around electrical outlets, plumbing fixtures, and doors and windows with flexible caulk will stop the passage of air and drafts that also transmit sound waves. Electrical outlets and switches should not be placed back to back, but should be staggered in the cavities to inhibit a direct path for sound to travel from room to room. Properly caulking the perimeter of each wall is equally important. Sound waves will seek all penetration points in a room, so the importance of sealing the perimeter gaps must be emphasized.

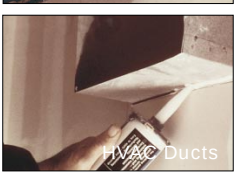
**Adding an extra layer of gypsum board on each side of a decoupled wall will improve the sound rating substantially.**

It is widely recognized that an STC of 50 is a minimum acceptable level for separations between apartments, town homes, and condominiums in multi-family housing. STCs over 55 are considered excellent. As shown by the examples that follow, gypsum board systems consisting of a combination of decoupling, additional mass, and insulation can achieve an STC rating of over 55.

The systems on the back page of this document illustrate construction methods to achieve higher STC ratings and will provide home owners and home builders with guidelines for selecting a satisfactory combination of sound control techniques. Sound test reports are available from the Gypsum Association for a nominal charge.

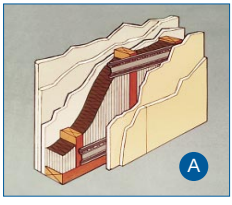

■ *Minimize wall penetrations. Where they do exist, ensure that they are adequately sealed to prevent unwanted sound intrusion.*

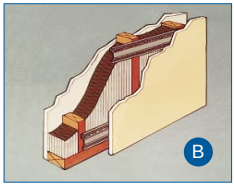
## FOUR KEYS TO SOUND CONTROL

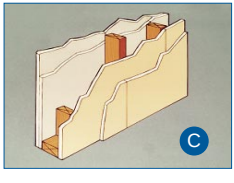
1. Increase the physical mass of the wall or ceiling by adding a layer of gypsum board.
2. Decouple one side of the wall with resilient channels or staggered studs.
3. Incorporate sound absorbing material into the wall cavity.
4. Seal flanking paths.

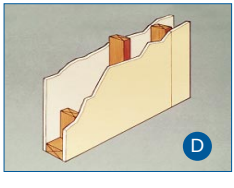
# WOOD-FRAMED WALL SYSTEMS

*The interior walls of most homes have an STC of about 35.*




## SYSTEM A - STC RATING = 59

Resilient channels placed 24 inches on center and attached to *one side* of wood studs, 16 inches on center. A base layer of 5/8-inch type X gypsum board applied to the channels with 1-inch Type S drywall screws placed 12 inches on center. A face layer of 5/8-inch type X gypsum board applied with 3/4-inch daubs of adhesive 12 inches on center vertically and horizontally. *Opposite Side*. A base layer of 5/8-inch type X gypsum board applied with 5d nails 32 inches on center. A second layer of 1/2-inch type X gypsum board applied with 8d nails 12 inches on center. A face layer of 1/4-inch regular gypsum board applied with 3/4-inch daubs of adhesive 12 inches on center vertically and horizontally; 2-inch glass fiber insulation stapled to the 3-layer side in the stud space.

**Test reference:** RAL TL69-286, GA File No. WP 3110.

## SYSTEM B - STC RATING = 50

Resilient channels placed 24 inches on center and attached to *one side* of 2 x 4 wood studs, 16 inches on center. One layer of 5/8-inch type X gypsum board applied to the channels with 1-inch Type S drywall screws placed 6 inches at horizontal joints and 12 inches on center at intermediate channels. *Opposite Side*. One layer of 5/8-inch type X gypsum board applied to the studs with 6d nails 8 inches on center. 3 1/2-inch glass fiber insulation placed in the stud space.

**Test reference:** RAL TL77-138, GA File No. WP 3230.

## SYSTEM C - STC RATING = 45

A base layer of 1/2-inch gypsum board applied to each side of 2 x 4 wood studs, 16 inches on center with 5d nails 24 inches on center. A face layer of 1/2-inch type X gypsum board applied to each side with 8d nails 12 inches on center at vertical joints and 24 inches on center at intermediate studs.

**Test reference:** KG 196, CONC 1.2.1.2.4.12.

## SYSTEM D - STC RATING = 30

One layer of 1/2-inch regular gypsum board applied to each side of 2 x 4 wood studs, 16 inches on center with 5d nails 8 inches on center.

**Test reference:** NRC #66, CONC 1.2.1.1.4.1.

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*The information for these systems is based on characteristics, properties, and performance of materials and systems obtained under controlled test conditions as set forth in the appropriate standards in effect at the time of the test. The Gypsum Association makes no warranties or other representations as to the characteristics, properties, or performance of any materials or systems in actual construction.*

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