QuietRock and QuietWood: Innovative Sound-Control Products

Product Review - *Environmental Building News* March 2005

Like VOCs and mold, unwanted noise can cause indoor environmental quality (IEQ) problems in our buildings. Along with the direct impacts of noise, such as hearing impairment, a host of other health effects are increasingly attributed to noise. These include elevated blood pressure and heart rate, cardiovascular constriction, sleep loss, labored breathing, changes in brain chemistry, and the production of stress hormones. Noise can also depress learning rates and cause psychological problems.

As with other IEQ problems in our buildings, it makes sense to reduce sources of this "contamination." Because sources of noise are often beyond our control, however (nearby highways, overhead planes, or a neighbor's leaf blower, for example), our best option in reducing exposure to noise is often to design wall, ceiling, and floor assemblies that reduce noise transmission.

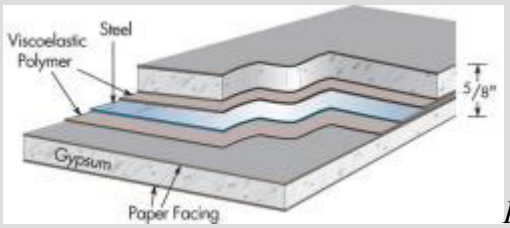

Illustration: Julia Jandrisits

Specially engineered layers of steel and polymer between thin panels of gypsum drywall dramatically improve the acoustic performance of QuietRock 530.

The most common strategies for noise control include adding layers of drywall, installing a sound-control layer such as Homasote ® 440, staggering wall studs on wider sill and top plates to minimize acoustical bridging, providing double-stud walls with an airspace between, adding resilient channel (steel "hat-track" furring channel) over studs or joists, and installing resilient sound-isolation clips (some of which are used in combination with resilient channel). One downside of most of these solutions is that they increase wall thickness to varying degrees, which corresponds to reduced floor area.

Table 1: QuietRock 530 Acoustic Performance with Various Wall Configurations

Table 1 – QuietRock 530 Acoustic Performance with Various Wall Configurations

Wall Configuration	Fire Rating	STC Rating	STC – Std. Drywall
Insulated 2x4 with QR 530 on one side	1 hour	52	34
Insulated 2x4 with QR 530 on both sides	1 hour	54	34
Rehab – existing insulated 2x4 with 1/2" drywall on both sides; QR 530 added to one side	1 hour	53	36
Rehab – existing insulated 2x4 with 1/2" drywall on both sides; QR 530 added to both sides	2 hours	56	38
Insulated staggered 2x4 wall (wider sill and top plates) with QR 530 on one side	1.5 hours	58	47
Insulated staggered 2x4 wall (wider sill and top plates) with QR 530 on both sides	1.5 hours	60	47
Insulated double 2x4 demising wall with QR 530 on one side	2 hours	63	58
Insulated double 2x4 demising wall with QR 530 on both sides	2 hours	66	58
Insulated 2x4 wall with three layers of QR 530	2 hours	57	38
Insulated staggered 2x4 wall (wider sill and top plates) with three layers of QR 530	2 hours	64	52
Insulated double 2x4 demising wall with three layers of QR 530	2 hours	74	69

All data from Quiet Solution, Inc.

A relatively new solution is to use specialized sound-control drywall or plywood from the Sunnyvale, California, company Quiet Solution, Inc. QuietRock™ and QuietWood™ rely on two distinct principles in reducing sound transmission. First, a thin layer of steel provides “constrained layer damping.” Second, two layers of a special *viscoelastic* polymer convert the energy from sound waves into kinetic energy (heat). The physics of sound transmission are complex, but this solution is elegantly simple—and remarkably space-efficient. “The viscoelastic polymer is doing the heavy lifting [for controlling sound transmission],” according to Quiet Solution founder and chairman Marc Porat, Ph.D.

QuietRock is available in several thicknesses; most common is QuietRock 530, which has an overall thickness of 5⁄8" (16 mm). It is made by laminating the abovementioned steel and viscoelastic layers between two sheets of 1⁄4" (6 mm) paper-faced drywall. Outwardly, this engineered drywall looks much like conventional 5⁄8" drywall, but it is heavier and its acoustic properties far different. QuietWood relies on identical principles, but the steel and viscoelastic polymer layers are laminated between wood veneers.

Table 2: Comparison of Various Sound-Control Wall Options

Table 2 – Comparison of Various Sound-Control Wall Options

Common Party Wall Assemblies	QuietRock 530	Resilient Channel	Sound Clips	Staggered Studs	Double Studs
Side A	QR 530	5/8" gypsum	5/8" gypsum	2 x 1/2" gypsum	5/8" gypsum
Frame	Single	Single	Single	Staggered	Double
Side B	5/8" gypsum	5/8" gypsum	5/8" gypsum	2 x 1/2" gypsum	5/8" gypsum
STC rating	52	48	56	52	58
Number of inspections	1	2	2	1	1
Wall thickness – inches (mm)	4.75 (121)	5.25 (133)	6.36 (162)	8 (203)	9.25 (235)
Floor area of 24' (8m) demising wall	9.5	10.5	12.75	16	18.5
Weight – lb/ft² (kg/m²)	5.3 (26)	5.3 (26)	5.7 (28)	6.5 (32)	6.1 (30)
Direct labor and materials - $/ft² ($/m²)	$5.89 ($63)	$5.35 ($58)	$5.65 ($61)	$5.92 ($64)	$5.51 ($59)
Value of lost floor space at $200/ft ($2,150/m²)	$0.00	$1.04	$3.39	$6.77	$9.38
Total assembly "cost" - $/ft² ($/m²)	$5.89 ($63)	$6.39 ($69)	$9.04 ($97)	$12.69 ($137)	$14.89 ($160)

All data from Quiet Solution, Inc. Costs attributed to R.S. Means, 29th edition, 2004.

Sound transmission class (STC) ratings for various wall configurations with QuietRock 530 are shown in Table 1, along with values for comparable walls with standard drywall. (STC is a single-number rating for the sound transmission through a wall or floor that accounts for sound transmission reductions at a standardized range of sound frequencies. For more information, see the feature article “Building Green . . . Quietly: Noise Pollution and What to Do About It” in *EBN* **Vol. 10, No. 1**.

Photos: Quiet Solution, Inc.

Quiet Solution, Inc., produces sound-control drywall, plywood, sealants, and adhesives. Using these components, a 2x4 wall can block noise as well as a standard double 2x4 wall.

The market for QuietRock and QuietWood today is primarily residential, according to Porat, with 80% wood-frame construction and 20% high-rise. Of the wood-frame market, about half is for single-family homes, with most of that interior partitions for acoustic isolation of home theaters and bedrooms. The

other half of the wood-frame market is for multi-family buildings, primarily in demising walls between units and in floor-ceiling assemblies. Building codes that require certain STC ratings in multifamily buildings—and the threat of lawsuits if those ratings are not achieved—are leading drivers for QuietRock and QuietWood sales, notes Porat. While commercial construction is a small market for these products today, use in hospitals has been growing.

The viscoelastic polymer is formulated to be environmentally benign, according to Porat, with near-zero emissions of volatile organic compounds (VOCs). “They’re completely clean,” Porat told *EBN*. “We pride ourselves in being a green company.” The company is looking into the use of flue-gas desulfurization (FGD) gypsum in the drywall, but the most widely used 1•4" drywall is available from far fewer sources than 1•2" or 5•8" drywall, and it has so far been unable to find a supply of the FGD product. (FGD gypsum is a byproduct of pollution-control equipment—scrubbers—on coal-fired power plants, so is considered a post-industrial recycled material.) A downside of these products is that recycling is not feasible, due to the composite nature of the materials.

QuietRock and QuietWood are about ten times as expensive as conventional drywall and plywood—about $80 per 4' x 8' sheet for the QuietRock 530, according to Porat. While very expensive on a per-sheet basis, these products are often less expensive than conventional practices for achieving high-STC wall and floor systems—especially if the value of floor area gained from thinner walls is included. “It’s always cheaper to deploy our solutions when you take into account labor and space savings,” said Porat—though in locations where labor is very cheap or one can’t ascribe a monetary value to the space savings, the dollar savings will be less. Comparative costs of different sound-control wall systems, including the value of lost floor space, are shown in Table 2.

QuietRock and QuietWood are currently sold through 230 dealers in all 50 states, and the dealer network is growing, says Porat. So far, the products have not been sold through big-box retailers, such as Home Depot and Lowe’s. Quiet Solution has been in business since 2002 and introduced QuietRock and QuietWood in 2004. The company also makes acoustic sealants and adhesives, some of which are used with QuietRock and QuietWood, and they produce acoustic coatings for automotive, boat, and aircraft applications.

– AW