STEELER

CONSTRUCTION SUPPLY

SRC - RESILIENT CHANNEL

1-800-275-2279

STEELER® INC. SRC

Resilient Channels for Sound Isolating Partitions

1-800-275-2279

STEELER® SRC (Sound Resilient Channel) is a economical solution to minimizing sound transmission between rooms in commercial or residential buildings. Used in conjuction with gypsum wallboard, sound caulking, and other typical sound isolation practices, this product will greatly reduce the transmission of sound between rooms or units of a building. Steeler's SRC is Lab Certified to STC 56. Report No. TL06-287; Dated August 16, 2006.

The Gypsum Association & ASTM has published documents regarding the installation of Sound Resilient Channels, and designing rooms to be more Sound Resilient. Essentially any path that air can travel is where sound will travel. It should be noted that sound isolation requires cooperation and consideration of the electrical, plumbing, and cabinet contractors.

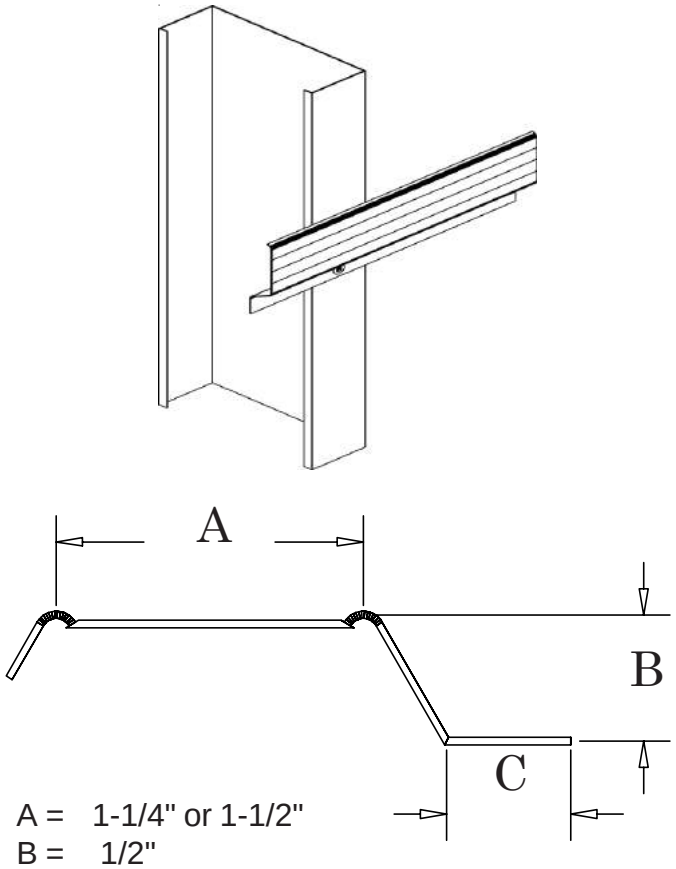
The developers of the Uniform Building Code and the technical staff of the International Conference of Building Officials have recognized the S.T.C. and Fire Resistance Ratings of the "generic" systems as set forth in the Gypsum Association's Fire Resistance & Sound Control Design Manual.

Table Of Contents

References: N.W.C.B. (Northwest Wall & Ceiling Bureau) - www.nwcb.org; Gypsum Association Fire Design Manual 2000; ICBO ES Report ER-1632.

STEELER® INC. Corporate Headquarters
(206) 725-2500 (206) 725-1700 FAX
(800) 275-2279 Toll Free
10023 Martin Luther King Jr. Way South
Seattle, WA 98178
marketing@steeler.com www.steeler.com

12 SRC (Resilient Channel)
STC 56 Lab Certified



A = 1-1/4" or 1-1/2"
B = 1/2"
C = 7/16" minimum

STEELER INC. is pleased to offer a Lab Certified product for use in wall assemblies requiring a **Lab Certified STC 56 Rated Product** for assemblies requiring higher STC ratings as stipulated by the Uniform Building Code **(Report No. TL06-287; Dated August 1, 2006)**. Our 12 SRC meets the minimum design dimensions (A,B&C) as shown on page 5 of the Gypsum Association's **ICC-ES ICBO No. 1632.**

When used in accordance with the Gypsum Association's Fire Resistance and Sound Control Design Manual, ***STEELER 12 SRC*** will meet or exceed their listed ratings.

STEELER 12 SRC is Lab Certified - STC 56; tested according to the provisions and requirements of ASTM E 90-04, Standard Test Methods for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.

Materials

a) Steeler 12 SRC (Part # 0125R050-018)
Available flanges of 1-1/4" and Extra Wide 1-1/2" (Part # 0150R050-018H)

Length = 12' - 0"
Custom Lengths Available

Available with hemming for 1-1/4" and hemming is required for 1-1/2"

Packaging = Bundles of 40
(480 feet per bundle)

b) Steeler Steel Framing; minimum 3-1/2" 25 gauge Steeler Studs (Part # 0350S125-018) & minimum 3-1/2" 25 gauge 1" Steeler Track (Part # 0350T100-018)

c) Steeler Construction Screws:
#7 x 7/16" Super Framers (PN # 23)
#8 x 9/16" Wafer Hd. Sharp Pt. (PN # 31)
#8 x 1/2" Super Wafer Hd. Driller (PN # 34Z)
#6 x 1" Super Steelers (PN # 168)
#10 x 1-1/2" Super Laminators (PN # 12)

d) OSI Sound Caulking Part # OSI SC175

e) 5/8" thick Type X Gypsum Board (Fire Rated)

f) 3-1/2" thick un-faced fiberglass sound insulations batts

Note: The products listed above have been tested as an assembly; subsitutions to the assembly have not been tested and may have substantially different results.

Steeler Sound Resilient Channels (12 SRC) are to be installed horizontally 24" O.C. to the framing.

Please refer to STEELER's SRC Technical Catalog (Orange Catalog) for detailed installation details, which is available from your Steeler Representative.

10023 Martin Luther King Jr. Way South - Seattle, WA. 98178 - (206)725-2500 - (206) 725-1700 FAX www.steeler.com

Document: ST-12SRC February 26, 2009

SECTION III
SOUND CONTROL

SOUND INSULATION

The first essential for airborne sound insulation using any system is to close off air leaks and/or flanking paths by which noise can go through or around the system. Small cracks or holes will increase the sound transmission at the higher frequencies. This can have a detrimental effect on the overall acoustical performance and the STC, particularly for higher rated systems. Failure to observe special construction and design precautions can reduce the effectiveness of the best planned sound control methods.

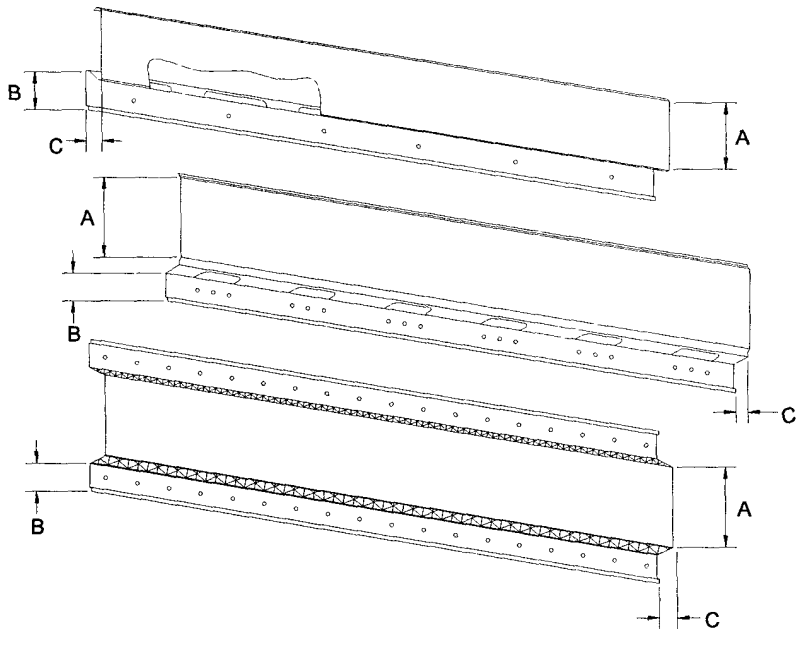
Systems shall be airtight. Recessed wall fixtures, such as medicine cabinets or electrical, telephone, television, and intercom outlets, that penetrate the gypsum board shall not be located back-to-back or in the same stud cavity. Any opening for fixtures or pipes shall be cut to the proper size and sealed. The entire perimeter of a sound insulating system shall be made airtight to prevent sound flanking. Flexible sealant or an acoustical gasket shall be used to seal between the STC rated system and all dissimilar surfaces and also between the system and similar surfaces where perimeter relief is required. TAPING GYPSUM BOARD WALL AND WALL-CEILING INTERSECTIONS PROVIDES AN ADEQUATE AIR SEAL AT THESE LOCATIONS. ASTM E 497, *Standard Practice for Installing Sound-Isolating Lightweight Partitions,* provides additional information. Consult the manufacturer of the gypsum board for any special recommendations.

Systems are grouped in ranges according to their Sound Transmission Class (STC) or Field Sound Transmission Class (FSTC). The higher ranges are shown first. All of the sound tests referenced were conducted according to the requirements of ASTM E 90, for laboratory tests, or ASTM E 336, for field tests. The designer shall adhere to the specified materials and construction details for STC and FSTC rated systems, particularly in plaster systems, because substitution of lightweight aggregates for sand, or reduction of the sand proportion, may reduce the rating. ALL OPENINGS THROUGH THE SYSTEM, AND ITS ENTIRE PERIMETER, SHALL BE SEALED AIRTIGHT.

SUBSTITUTING MECHANICAL FASTENERS FOR ADHESIVES, OR THE USE OF MORE FASTENERS, MAY AFFECT THE RATING.

Details of sound tests issued by sound testing agencies are on file and a summary is available from the Gypsum Association or the test sponsor.

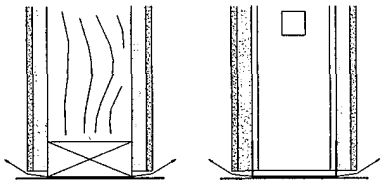
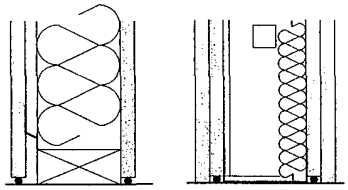
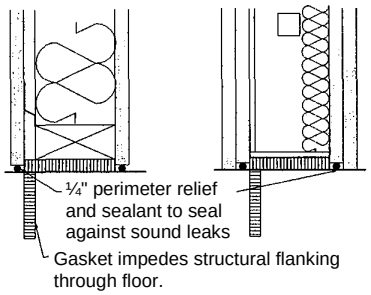
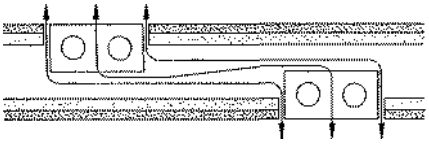
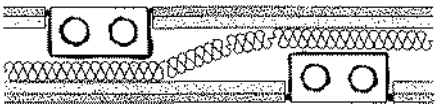
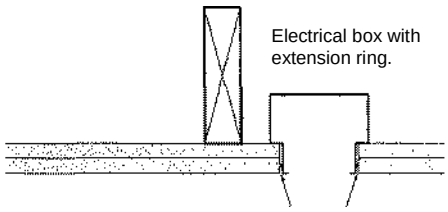
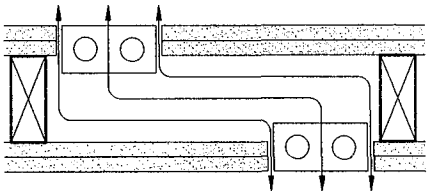
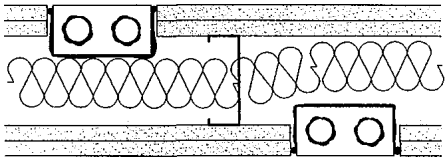
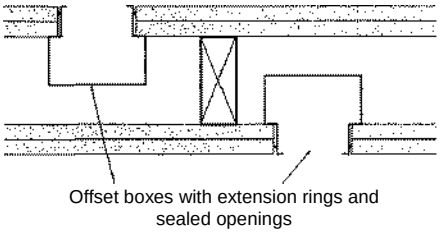
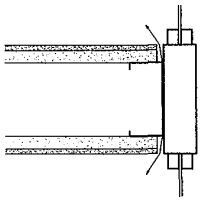
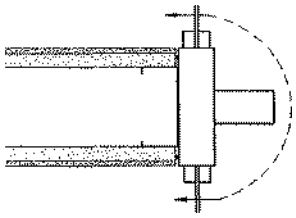
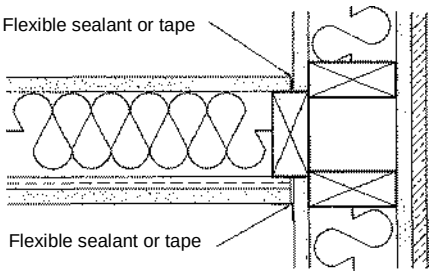
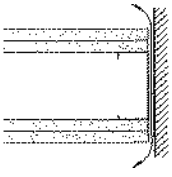
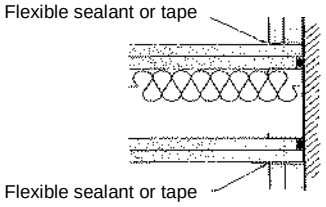
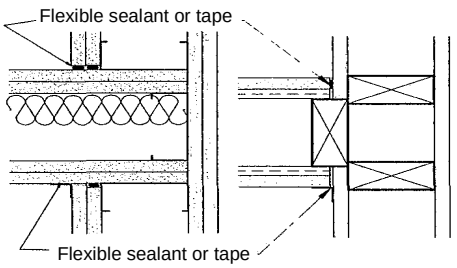
Figure 11 shows three typical resilient channel configurations. Where resilient channels are included in systems, the resilient channels are shown by a dashed line to distinguish them from rigid furring channels. Figure 12 distinguishes between standard construction practices and those practices recommended for improved sound control.



Typical dimensions for all designs:
Base metal thickness = nominal 25 gage
A = 1 1/4" minimum
B = 7/16" minimum
C = 1/2" minimum

Figure 11
Resilient Furring Channels

Figure 12
Sound Isolation Construction

"NORMAL" CONSTRUCTION ARROWS SHOW FLANKING PATHS	"SELECT" CONSTRUCTION SEALING OF RELIEF DETAIL AT PERIMETER OF PARTITION AND AROUND CUT-OUTS TO PREVENT SOUND LEAKAGE	"PRE-DESIGN" CONSTRUCTION SIMULATED LABORATORY CONDITIONS
 ELEVATION Under and over partitions	 ELEVATION Flexible sealant	 ELEVATION
 PLAN Through-partition openings outlet boxes	 PLAN Sealing of openings through partitions	 ELEVATION Typical floor-ceiling or roof detail
 PLAN Through-partition openings outlet boxes	 PLAN Boxes offset one stud space and sealing of openings through partitions	 PLAN Outlet box detail
 PLAN Flanking at partition-mullion intersection	 PLAN Typical partition-mullion intersection	 PLAN Intersection with exterior wall
 PLAN Metal Stud Around-flanking partition ends	 PLAN Intersection with interior wall	 PLAN Typical partition intersection

SOUND TRANSMISSION LOSS TESTS

ASTM E 90, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions,* is the procedure for measuring the sound transmission loss (STL) in a laboratory. The STL is the difference between the sound energy (sound pressure level) in a source room and a receiving room when the two rooms are separated by the system being tested.

ASTM E336, *Standard Test Method for Measurement of Airborne Sound Insulation in Buildings,* is the procedure to determine the field sound transmission loss (FSTL) between two rooms under field conditions.

The STL or the FSTL is measured at 1/3 octave test frequencies (Hz) as follows and the sound transmission loss curve is plotted:

125	315	800	2000
160	400	1000	2500
200	500	1250	3150
250	630	1600	4000

A system's overall effectiveness in resisting the transmission of airborne sound, whether it is a wall, partition, or floor-ceiling, is reported as a single number derived from an analysis of the STL or FSTL curve. This rating is the Sound Transmission Class (STC) or Field Sound Transmission Class (FSTC). This Manual uses STC/FSTC ranges to make comparing systems more significant.

ASTM E413, *Classification for Rating Sound Insulation,* is the method used to derive the STC/FSTC from the STL/FSTL curve. Using the rules stated in ASTM E 413, a reference contour is fitted to the sound transmission loss curve. The STC/FSTC is the point where the reference contour crosses the 500 Hz line.

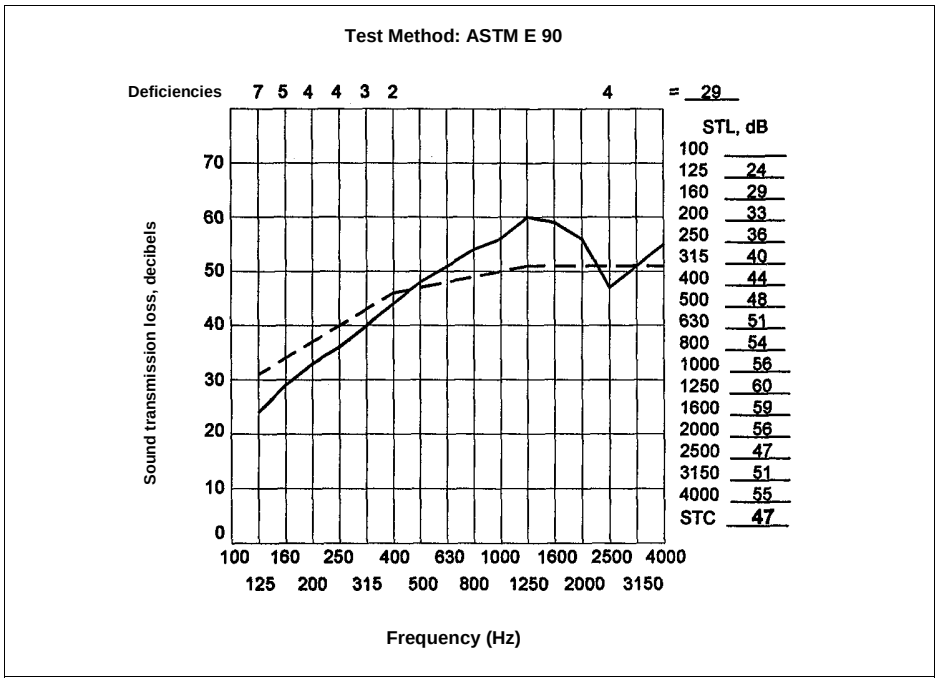


Figure 13
STL Curve

The reference contour, shown by the dashed line in Figure 13, has a flat portion from 4000 Hz to 1250 Hz. It drops 5 dB between 1250 Hz and 400 Hz, and 15 dB between 400 Hz and 125 Hz. In fitting the reference contour to the measured curve, the following conditions are required to be met:

1. The STL curve is not permitted to be greater than 8 dB below the reference contour at any test frequency, and
2. The sum of the dB differences between the points on the reference contour and the corresponding points on the STL curve at each of the test frequencies is not permitted to be greater than 32 dB.

Some of the STC ratings in this Manual were derived according to slightly different standards in use prior to 1970. For instance, ASTM E 90-61T, the previous sound test procedure, called for measurements at ½ octave frequencies, and the rules for fitting the standard curve were different.

The smallest dimension of the system tested in accordance with ASTM E 90 is not permitted to be less than 7 feet, 10 inches and the minimum volume for each of the sound source and receiving rooms is 2,825 cubic feet. The system is constructed to separate the source and receiving rooms, which are arranged so that the only significant sound transmission is through the test specimen.

The source room contains one or more sound sources, a diffusing system such as multiple stationary and/or rotating reflectors, and microphones located to adequately sample the sound field in the space. A single microphone on a rotating boom may be optionally used. The receiving room is similarly equipped, except that the sound source(s) is used only to determine the reverberation time for correction purposes. The sound measurements in both rooms are made according to ASTM E 90.

Research by recognized sound test authorities indicates that the STC's on unsymmetrical walls are not affected by sound testing from either side. Therefore, the laboratory sound source side is not indicated for unsymmetrical systems in this Manual.

IMPACT NOISE TEST

To determine the Impact Insulation Classification (IIC) of a floor, a standard ISO impact machine with steel hammers taps on a test floor system installed above a special receiving room. Microphones in the receiving room record the average sound pressure level produced by the tapping machine at 1/3 octave frequency bands between 100 and 3150 Hz. These measured levels are then normalized to a standard room absorption. The method used is described in ASTM E 492, *Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine.*

The IIC is determined by comparing the normalized impact sound pressure levels at the 16 test frequencies with an IIC reference contour. The reference contour has a flat portion from 100 to 315 Hz, a middle line segment decreasing 5 dB in the interval 315 to 1000 Hz, followed by a high frequency line segment decreasing 15 dB in the interval 1000 to 3150 Hz. In fitting the reference contour to the measured sound pressure levels in the receiving room, the following conditions are required to be met:

1. The noise level at any test frequency is not permitted to be greater than 8 dB above the reference contour, and
2. The sum of the dB differences between the points on the reference contour and the corresponding points on the curve of the normalized impact noise levels at each of the test frequencies is not permitted to be greater than 32 dB.

The IIC for the specimen is the difference between 110 and the value on the normalized impact noise level scale (i.e., ordinate scale) at 500 Hz of the lowest contour for which the above conditions are fulfilled.

The IIC listings for floor-ceiling systems in this Manual are for bare floors (no floor covering) and for the addition of a carpet over a separate pad, which is identified as "C&P."

Although any carpet, with or without a pad, will improve the IIC, a heavy wool carpet over a good quality pad will make a significant improvement, as illustrated for FC 5300 on page 109. The addition of a 44 oz. woven loop pile carpet over a 40 oz. hair felt pad increased the IIC from 38 to 63. The IIC (C&P) listings in this Manual are for the carpet and pad described above for FC 5300 unless otherwise noted. The use of other types of carpets, both with and without pads, will result in increases in the IIC, and in some instances may equal that achieved by use of the aforementioned carpet and pad.

ES REPORT™

ER-1632

Reissued February 1, 2002

ICBO Evaluation Service, Inc. • 5360 Workman Mill Road, Whittier, California 90601 • www.icboes.org

Filing Category: FIRE-RESISTIVE CONSTRUCTION—Gypsum Wallboard

GYPSUM WALL AND CEILING ASSEMBLIES

GYPSUM ASSOCIATION
810 FIRST STREET, N.E., SUITE 510
WASHINGTON, DC 20002

1.0 SUBJECT

Gypsum Wall and Ceiling Assemblies.

2.0 DESCRIPTION

2.1 General:

This evaluation report recognizes fire-resistive wall, floor-ceiling and roof-ceiling assemblies consisting of gypsum board products conforming to those types listed in Section 2.2.1 of this report.

2.2 Materials:

2.2.1 Gypsum Board: Gypsum boards shall comply with one of the following standards:

- ASTM C 36-97, Standard Specification for Gypsum Wallboard.
- ASTM C 79-97, Standard Specification for Gypsum Sheathing Board.
- ASTM C 442-97, Standard Specification for Gypsum Backing Board and Coreboard.
- ASTM C 588-95a, Standard Specification for Gypsum Base for Veneer Plasters.
- ASTM C 630-96a, Standard Specification for Water-resistant Gypsum Backing Board.
- ASTM C 931-97, Standard Specification for Exterior Gypsum Soffit Board.

Except where otherwise noted in this report, any of the gypsum boards of the same size, thickness and core type specified may be used. The gypsum base for veneer plasters must be covered with minimum $^1/_{16}$-inch-thick (1.6 mm) gypsum veneer plaster.

2.2.2 Screws: Type S, Type W and Type G screws specified in the assemblies in this report must comply with ASTM C 1002-98a or ASTM C 954-98.

2.3 Design:

The axial design stress of the wood studs shall be reduced to $0.78F_c$, calculated in accordance with Section 3.6 of the NDS*, with the maximum design stress not greater than 78 percent of the calculated allowable stress with studs having a slenderness ratio, l_e/d, of 33.

2.4 Fire-resistive Assemblies:

2.4.1 Two-hour Gypsum Board Solid Partition for Shaft Enclosure: The assembly is similar to Item 12-1.1 of Table 7-B of the 1997 *Uniform Building Code*™ (UBC), or Item 9-1.1 of Table 719.1(2) of the 2000 *International Building Code*® (IBC), except that the gypsum coreboard is first installed onto 2-inch-by-2-inch (51 mm by 51 mm) steel floor and ceiling runners using Type S screws spaced 12 inches (305 mm) on center. The runners are anchored at 24 inches (610 mm) on center, using approved fasteners. Two layers of $^1/_2$-inch-thick (12.7 mm), Type X gypsum board are laminated to one side of the coreboard, with all of the vertical joints being offset at least 3 inches (76 mm).

The assembly may also be constructed with four layers of $^1/_2$-inch-thick (12.7 mm), Type X gypsum board, laminated together, with the joints of each layer offset at least 3 inches (76 mm) from the adjoining layers. The laminating compound must comply with ASTM C 475-94 or be an approved powder setting-type compound. The first layer is attached to the 2-inch-by-2-inch (51 mm by 51 mm) steel floor and ceiling angle runners using one $^7/_8$-inch-long (22 mm), Type S screw at each corner. The second layer is then fully laminated to the first layer and screw-attached to the runners using $1^{15}/_{16}$-inch-long (49.2 mm), Type S screws spaced 12 inches (305 mm) on center. The third layer is laminated in the same manner as the second layer, and is further attached using $1^1/_2$-inch-long (38 mm), Type G screws spaced 24 inches (610 mm) on center along the edges and along the center, and held back $2^1/_2$ inches (63.5 mm) from the top and bottom edges. The fourth layer is fully laminated, with all of the vertical joints being offset.

2.4.2 One-hour Gypsum Board Partition with Wood Framing:

The framing consists of nominal 2-by-4 wood studs spaced 16 inches (406 mm) on center, with blocking of the same size at midheight. Each side of the wall is covered with a single layer of $^5/_8$-inch-thick (15.9 mm), Type X gypsum board applied either perpendicular to or parallel to the framing. The gypsum board is attached to the framing using No. 6 by $1^1/_4$-inch-long (31.7 mm), buglehead, Type W screws spaced 8 inches (203 mm) on center along end joints and 12 inches (305 mm) on center in the field. Screws are placed no closer than $^1/_2$ inch (12.7 mm) to end or edge joints. Vertical joints are staggered 16 inches (406 mm) on center and horizontal joints are staggered 12 inches (305 mm) on center on each side. The joints are taped with joint tape and covered with two coats of joint compound. Screw heads are covered with joint compound.

*In this document, "NDS" refers to the revised 1991 edition of, and the supplement to, the ANSI/NFoPA NDS-91 National Design Specification for Wood Construction (NDS) as adopted by reference in Division III, Part I, Chapter 23, of the 1997 *Uniform Building Code*™, or refers to ANSI/NFoPA NDS-97, as adopted by reference in Section 2306.1 of the 2000 *International Building Code*®.

2.4.3 One-hour Gypsum Board Staggered-stud Bearing Partition: The framing consists of two rows of either nominal 2-by-3 wood studs spaced at 16 inches (406 mm) on center or nominal 2-by-4 wood studs spaced at 24 inches (610 mm) on center, with blocking of the same size at midheight. Studs in opposite rows are staggered 8 inches (203 mm) or 12 inches (305 mm) on center, and the rows are spaced a minimum of 1 inch (25.4 mm) apart. The plates for each row may be of the same size and material, or common plates may be used for the two rows. The exterior face of each row is then covered with $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board applied horizontally or vertically using 6d cement-coated cooler nails at 7 inches (178 mm) on center, with end joints on nailing members. Fire-blocks, when required, either may be of mineral wool batts, 2 inches (51 mm) thick in the intervening spaces between the two rows of studs, or may be of $^{1}/_{2}$-inch-thick (12.7 mm) gypsum board. Where nominal 2-by-3 studs are used, they must be stress-graded lumber as set forth in Tables 4A through 4D of the NDS.

2.4.4 One-hour Gypsum Board Floor-ceiling or Roof-ceiling Assembly with Wood Framing: The ceiling construction is identical to assembly FC5406 in the Gypsum Association Fire Resistance Design Manual. Alternate framing may consist of lower chords of trussed rafters, or pitched or flat trusses spaced a maximum of 24 inches (610 mm) on center. Alternate fasteners, having the same spacing as the screws, may be $1^{7}/_{8}$-inch-long (47.6 mm), 6d cooler, box or wallboard nails for the base ply and $2^{3}/_{8}$-inch-long (60 mm), 8d cooler, box or wallboard nails for the face ply. Type G screws, $1^{1}/_{2}$ inches (38 mm) long, are still required at the end joints of the gypsum board face layer.

2.4.5 One-hour Gypsum Board Roof-ceiling Assembly with Steel Framing: The assembly consists of steel roof framing with roof purlins spaced and designed to support a noncombustible ceiling grid to which is attached double $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board. Cold-rolled steel main runner channels at 4 feet (1219 mm) on center, with size and hanger support complying with Table 25-A of the UBC or Section 2506.2.1 of the IBC, are hung from the steel framing. Number 25 gage, $^{7}/_{8}$-inch-deep (22 mm), rigid cross-furring channels are spaced 24 inches (610 mm) on center. Furring channels are wire-tied to the runner channels using loops of No. 16 gage wire.

The base layer of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board is applied at right angles to the furring channels using 1-inch-long (25.4 mm), Type S screws 24 inches (610 mm) on center. The face layer of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board is applied at right angles to the furring channels, using $1^{5}/_{8}$-inch-long (41.3 mm), Type S screws 12 inches (305 mm) on center at joints, driven through the base layer and into the intermediate furring channels. Face layer joints are offset 24 inches (610 mm) from the base layer joints. One-and-one-half-inch-long (38 mm), Type G screws, placed 2 inches (51 mm) from either side of the face layer end joints, are also installed at 12 inches (305 mm) on center. Insulation may be added to the assembly, provided a minimum plenum space of 10 inches (254 mm) is maintained between the underside of the insulation and the gypsum panel.

2.4.6 Two-hour Gypsum Board Floor-ceiling Assembly: The construction consists of minimum $9^{1}/_{2}$-inch-deep (241 mm) wood I-joists spaced a maximum of 24 inches (610 mm) on center, nominal 2-by-10 wood joists spaced a maximum of 16 inches (406 mm) on center, or minimum 18-inch-deep parallel wood chord trusses spaced a maximum of 24 inches (610 mm) on center. Wood I-joists must be secured to the wall top plates with two 10d nails at each end. The joists support nominal minimum $^{23}/_{32}$-inch-thick (18.3 mm), tongue-and-groove wood structural panels applied perpendicular to the joists, attached with 8d common nails spaced 6 inches (152 mm) on center at panel edges and ends and 12 inches (305 mm) on center in the field of the board.

A base layer of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board is attached perpendicular to the bottom chord of the framing using $1^{1}/_{4}$-inch-long (31.7 mm), Type W screws. A second layer of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board is attached perpendicular to the framing, staggered 24 inches (610 mm) from the first layer, and is attached using 2-inch long, Type S screws. A third layer of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board is attached perpendicular to the framing, staggered 12 inches from the second layer, and is attached using $2^{1}/_{2}$-inch-long (63.5 mm), Type S screws. Screws for all layers are spaced 12 inches (305 mm) on center at joists and not less than 1 inch (25.4 mm) from side and end joints. Adjacent joints in the same layer are offset 48 inches (1219 mm). Layers must be overlapped so that edges and end joints are offset not less than 10 inches (254 mm) from the previous layer. Minimum 0.0179-inch-thick (0.45 mm), $^{7}/_{8}$-inch-deep (22 mm), hat-shaped furring channels, spaced 24 inches (610 mm) on center and oriented perpendicular to the framing members, are attached through the gypsum board to the framing members with two $2^{1}/_{2}$-inch-long (63.5 mm), Type S screws at each joist intersection. A face layer of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board is attached perpendicular to the furring channels using $1^{1}/_{8}$-inch-long (28.6 mm), Type S screws, spaced at 12 inches (305 mm) on center. All face layer gypsum board joints must be covered with tape and one coat of joint compound, and face layer fastener heads must be covered with one coat of joint compound.

The minimum $^{23}/_{32}$-inch-thick wood structural panels are not required to establish the fire-resistance rating of the assembly. Other materials are acceptable provided the structural requirements of the code are addressed.

2.4.7 Two-hour Gypsum Board Bearing Wall with Minimum STC 50 Sound Rating: The construction consists of nominal 2-by-4 wood studs spaced 16 inches (406 mm) on center, faced on each side with two layers of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board. On one side, the gypsum board is fastened directly to the studs as specified for interior partitions in Item 17-1.5 of Table 7-B of the UBC or Item 14-1.5 of Table 719.1(2) of the IBC; on the other side, resilient furring channels spaced 24 inches (610 mm) on center (see Figure 1) are applied horizontally over the wood studs and are attached using 6d common or $1^{1}/_{4}$-inch (31.7 mm) wallboard nails or 1-inch-long (25.4 mm), Type W or Type S screws.

The $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum board is applied horizontally and is attached along longitudinal edges to the furring channels using 1-inch-long (25.4 mm), Type S screws spaced 12 inches (305 mm) on center. Six-inch-wide (152 mm) strips of gypsum board are installed behind unsupported vertical butt joints and are attached at the ends and along the length of the strips using Type G, $1^{1}/_{2}$-inch-long (38 mm) screws spaced 12 inches (305 mm) on center. A face layer of $^{5}/_{8}$-inch-thick (15.9 mm), Type X gypsum

board is applied with joints staggered from the base layer joints and secured to the resilient furring channels using $1^5/_8$-inch-long (41.3 mm), Type S screws spaced 12 inches (305 mm) on center. With this partition, a minimum STC rating of 50 is attained. When desired, glass fiber or mineral wool insulation may be installed in the stud cavities.

2.4.8 Control Joints: Control joints such as those shown in Figure 2 may be used in one-hour or two-hour fire-resistive construction described in this report or described in Table 7-B of the UBC or Table 719.1(2) of the IBC. The joints may be used on bearing or nonbearing walls of wood or steel construction.

2.4.9 Alternate Construction:

2.4.9.1 Alternate Suspended Ceiling Construction: Gypsum board ceilings directly attached to steel framing as set forth in Table 7-C of the UBC or Table 719.1(3) of the IBC may be suspended by means of $1^1/_2$-inch (38 mm) cold-rolled steel main runner channels, spaced 48 inches (1219 mm) on center, that are suspended with No. 8, SWG galvanized wire hangers spaced 48 inches (1219 mm) on center. Furring channels are placed perpendicular to the cold-rolled steel main runner channels and are secured thereto using No. 18, SWG galvanized wire ties (double strand); the gypsum board is then installed in the manner required for direct attachment.

2.4.9.2 Alternate Gypsum Board Fasteners: Screws, either Type W or Type S, depending on the framing member, may be used in lieu of nails in fire-resistive assemblies described in this report or described in Tables 7-B and 7-C of the UBC or Table 719.1(2) and 719.1(3) of the IBC, provided the screw penetration into the framing member is equivalent to the nail penetration, the screw spacing is the same as the nail spacing, and the cross-sectional area of the screws is equal to that of the specified nails.

2.4.10 Joint Treatment: For the assemblies in this report, including those described in Section 2.4.12, taping and finishing of joints and fasteners may be omitted in the following cases:

1. Where there is square-edge gypsum board and tongue-and-groove-edge (V-edge) gypsum backing board or gypsum sheathing.
2. Single-layer application on wood-framed assemblies where joints fall over framing members.
3. On inner layers and outer layers of multiple-layer wood-framed or steel-framed assemblies, where the joints of adjacent layers are offset from each other.

2.4.11 Fire-resistive and Sound Control Systems:

2.4.11.1 Fire-resistive Systems: Generic fire-resistance ratings (those not designated as proprietary in the listing), as listed in the Gypsum Association Fire Resistance Design Manual, 14th edition (when enforcing the UBC), 15th edition (when enforcing the IBC), or 16th edition (when enforcing the 2001 Supplement to the IBC), may be accepted.

2.4.11.2 Sound Control Systems: Generic sound control systems, as listed in the Gypsum Association Fire Resistance Design Manual, 14th edition (when enforcing the UBC), 15th edition (when enforcing the IBC) or 16th edition (when enforcing the 2001 Supplement to the IBC), may be accepted if the system has a minimum STC rating of 50 for partitions, and minimum STC and IIC ratings of 50 for floor-ceiling systems. Partition systems shall be sealed, above the top and below the bottom wood plates or steel runners, using beads of non-hardening caulking compound, except that tape and joint compound may be used in lieu of caulking above the top plate in wood-framed systems. Where carpet and pad are specified for the IIC sound rating shown in the manual, the carpet shall be a 44-ounce (1492 g/m^2) wool carpet with a 40-ounce (1356 g/m^2) hair pad.

2.5 Allowable Partition Heights:

2.5.1 Gypsum Board or Veneer Base: To comply with Section 1611.5 of the UBC and Section 1607.13 and Table 1604.3 of the IBC, the allowable height limits of non-bearing partitions are as follows:

1. Partitions utilizing No. 25 gage [minimum 0.0179 inch (0.454 mm) uncoated base-metal thickness] steel channel studs conforming to ASTM C 645-99 shall have maximum heights as set forth in a current ICBO ES evaluation report. Mechanical fastening of intermediate studs to the track is not required unless this is specified in the evaluation report.
2. Solid partitions, constructed of $^1/_2$-inch- or $^5/_8$-inch-thick (12.7 mm or 15.9 mm), Type X gypsum board laminated to each side of 1-inch-thick (25.4 mm) solid or laminated gypsum coreboard, shall not exceed 11 feet (3353 mm).
3. Two-and-one-fourth-inch-thick (57 mm) semi-solid partitions, constructed of $^5/_8$-inch-thick (15.9 mm) gypsum board face sheets laminated to each side of 1-inch-by-6-inch (25.4 mm by 152 mm) solid or laminated gypsum board ribs spaced 2 feet (610 mm) on center, shall not exceed 12 feet (3658 mm).
4. Two-and-five-eighths-inch-thick (67 mm) semi-solid partitions, constructed of $^1/_2$-inch-thick (12.7 mm) gypsum board face sheets laminated to each side of $1^5/_8$-inch-by-6-inch (41.3 mm by 152 mm) laminated gypsum board ribs spaced 2 feet (610 mm) on center, shall not exceed 12 feet (3658 mm).
5. Chase walls consisting of a double row of $1^5/_8$-inch-deep (41.3 mm) No. 25 gage channel steel studs complying with ASTM C 645-99, and spaced 24 inches (610 mm) on center. The studs are placed opposite each other, and are so located that the outer flanges of the studs are 10 to 15 inches (254 to 381 mm) apart.

   The two rows of studs are interconnected at 4-foot (1219 mm) intervals using $^5/_8$-inch-thick (15.9 mm) square [10- to 15-inch (254 to 381 mm) sides] pieces of gypsum board attached to each web of the studs using three 1-inch-long (25.4 mm), Type S screws. Full-length sheets of $^5/_8$-inch-thick (15.9 mm) gypsum board are applied vertically to each face of the partition and are attached to studs using 1-inch-long (25.4 mm), Type S screws spaced 12 inches (305 mm) on center. The maximum partition height shall not exceed 16 feet (4877 mm).
6. Demountable walls consisting of $2^1/_2$-inch-deep (63.5 mm), No. 25 gage, channel-shaped studs complying with ASTM C 645-99 and spaced 24 inches (610 mm) on center. Full-length sheets of $^1/_2$-inch-thick (12.7 mm) gypsum board are installed vertically with edge joints centered on stud flanges. Edge joints are covered with a metal batten strip attached to the studs using 1-inch-long (25.4 mm), Type S screws spaced 12 inches (305 mm) on center. The gypsum board is attached to intermediate studs using an approved adhesive. The maximum partition height shall not exceed 11 feet 6 inches (3505 mm).

2.5.2 Lath and Plaster: To comply with Section 1611.5 of the UBC, or Section 1607.13 and Table 1604.3 of the IBC, the allowable height limits of No. 25 gage steel-stud nonbearing partitions are as follows: The steel studs shall comply with Item 1 of Section 2.4.10.1 of this report. The allowable heights and sectional properties of steel stud systems are as set forth in a current ICBO ES evaluation report.

2.6 Nonrated Construction:

Where a fire-resistive rating or a shear value is not required, 4d, $1^3/_8$-inch-long (35 mm), $^1/_4$-inch-diameter-concave-head (6.4 mm), 0.080-inch-diameter-shank (2.03 mm), phosphate-etched, diamond-point wallboard nails spaced in accordance with Table 25-G of the UBC or Section 2508 of the IBC may be used for the attachment of $^1/_2$-inch-thick (12.7 mm) gypsum board to wood supports. Where a fire-resistive rating or shear value is not required, predecorated nails may be used for the attachment of $^1/_2$-inch-thick and $^5/_8$-inch-thick (12.7 mm and 15.9 mm) predecorated gypsum board to wood supports. The $^1/_2$-inch-thick (12.7 mm) board is fastened to vertical surfaces using $1^3/_8$-inch-long (35 mm), 0.066-inch-diameter-shank (1.68 mm), 0.135-inch-diameter-head (3.43 mm) nails spaced 8 inches (203 mm) on center. The $^5/_8$-inch-thick gypsum board is fastened using $1^7/_8$-inch-long (47.6 mm), 0.086-inch-diameter-shank (2.18 mm), 0.135-inch-diameter-head (3.43 mm) nails spaced 8 inches (203 mm) on center.

A combination of fasteners, consisting of nails along the board perimeter and screws in the field of the gypsum board, may be used. The size and spacing of the nails and screws must be in accordance with Table 25-G of the UBC or Section 2508 of the IBC; the spacing between a perimeter nail and an adjacent field screw shall not exceed the spacing specified for screws in that table.

2.7 Identification:

Gypsum boards shall be identified, in accordance with ASTM C 1264-99, by the manufacturer's name, the thickness, the brand name and the ASTM specification. Bundles of steel studs shall be identified as set forth in a current ICBO ES evaluation report on the product. Screws shall be identified on the packaging by the name, brand or trademark of the producer or supplier and the ASTM designation.

3.0 EVIDENCE SUBMITTED

Reports of fire endurance tests in accordance with UBC Standard 7-1 (ASTM E 84), transverse load tests and sound transmission tests.

4.0 FINDINGS

That the gypsum wall and ceiling assemblies described in this report comply with the 1997 *Uniform Building Code*™ (UBC), the 2000 *International Building Code*® (IBC), the 2000 *International Residential Code*® (IRC), and the 2001 Supplement to the International Codes, subject to the following conditions:

4.1 Partition construction and heights are as set forth in this report. Indicated stud spacings are maximums. Stud sizes (depths) and gages are minimums.

4.2 Allowable shear for vertical diaphragms must be reduced 50 percent for dynamic loading due to earthquake in Seismic Zones 3 and 4 in jurisdictions enforcing the UBC, and Seismic Design Category D in areas enforcing the IBC or IRC. In jurisdictions enforcing the IBC or IRC, gypsum board shall not be used to resist seismic forces in structures in Seismic Design Category E or F.

4.3 The axial load design stress for the wall-framed bearing walls described in Section 2.4 of this report is limited to $0.78F_c$, and the maximum stress may not exceed $0.78F_c$ at a maximum l_e/l_d ratio of 33.

4.4 Compliance of the gypsum boards and the screws with the applicable standards noted in Section 2.2 of this report is verified.

This report is subject to re-examination in two years.

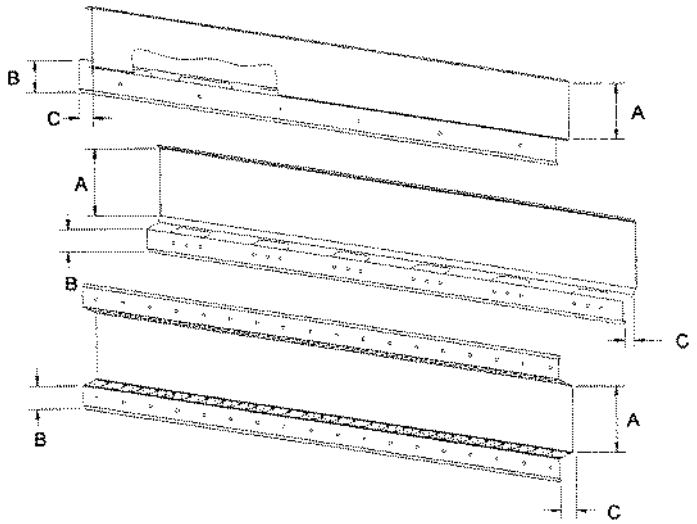
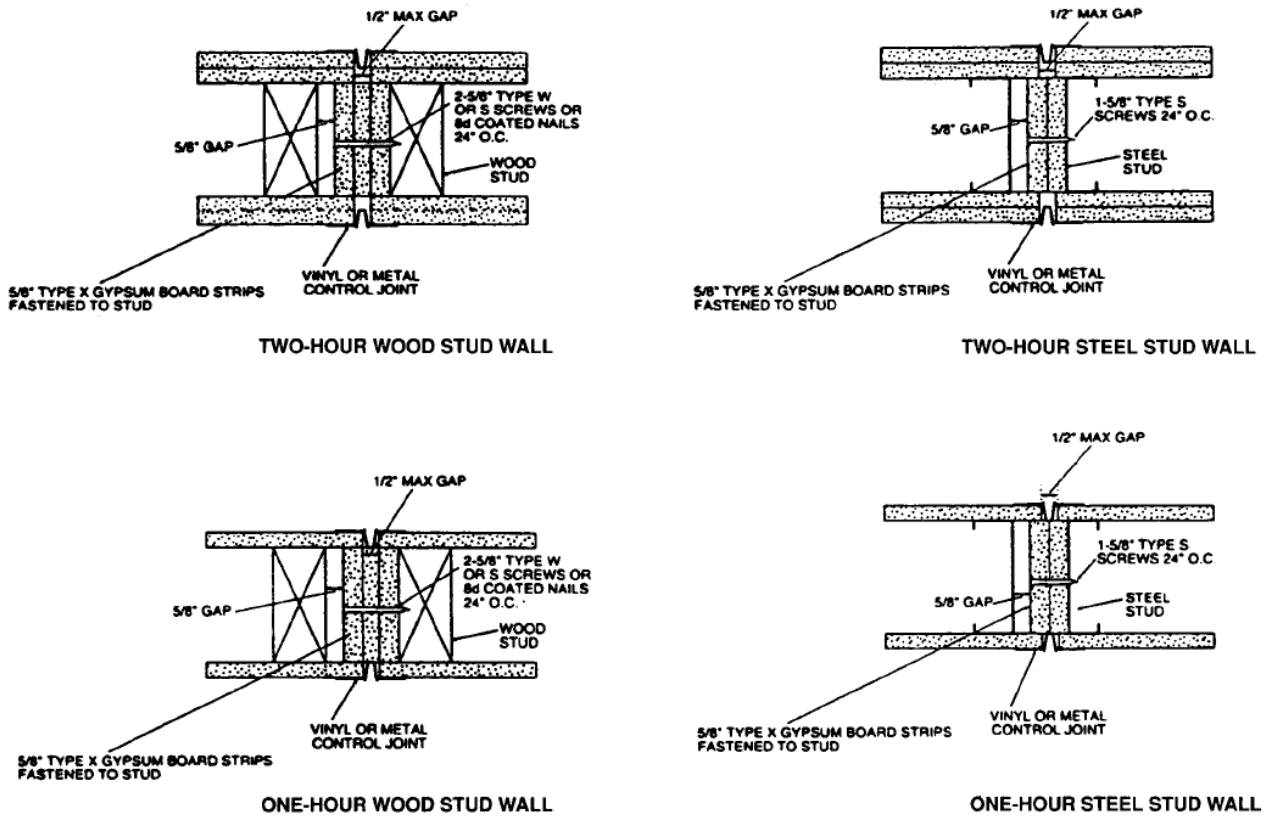


FIGURE 1—TYPICAL RESILIENT FURRING CHANNEL CONFIGURATIONS

Minimum for all designs:
Base-metal thickness = 0.0209" min.—A = $1^1/_4$" min.; B = $^7/_{16}$" min.; C = $^1/_2$" min. (depth)

For **SI:** 1 inch = 25.4 mm.



For **SI:** 1inch = 25.4 mm.

FIGURE 2—CONTROL JOINT DETAILS

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SOUND TRANSMISSION LOSS TEST REPORT NO. TL06-287

CLIENT: **Steeler, Inc.**
10023 Martin Luther King, Jr. Way South
Seattle, WA 98178
TEST DATE: 31 July 2006

16 August 2006

INTRODUCTION

The methods and procedures used for this test conform to the provisions and requirements of ASTM E 90-04, *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*. Copies of the test standard are available at www.astm.org. The test chamber source and receiving room volumes are 204 and 148.4 cubic meters respectively. Western Electro-Acoustic Laboratory is accredited by NVLAP (National Voluntary Laboratory Accreditation Program) Lab Code 100256-0 for this test procedure. NVLAP is part of the United States Department of Commerce, National Institute of Standards and Technology (NIST). This test report relates only to the item(s) tested. Any advertising that utilizes this test report or test data must not imply product certification or endorsement by WEAL, NVLAP, NIST or the U.S. Government.

DESCRIPTION OF TEST SPECIMEN

The test specimen was a wall assembly constructed from metal studs and type X gypsum board. The metal studs were Steeler 350S125-018, 25 gauge 3-1/2 inch (88.9 mm) by 1-1/4 inch (31.8 mm), and were spaced at 24 inches (610 mm) O.C. The head and sill tracks were Steeler 350T125-018, 25 gauge 3-1/2 inch (88.9 mm) by 1-1/4 inch (31.8 mm). The studs and track at the perimeter of the specimen were isolated from the test opening with 1/4 inch (6.4 mm) neoprene pads. On the source room side Steeler 125R050-018 sound resilient channels, 25 gauge 1/2 inch (12.7 mm) by 1-1/4 inch (31.8 mm), were attached to the studs. The resilient channels were horizontal, spaced at 24 inches (610 mm) O.C., and attached with Steeler #7 x 7/16" (11.1 mm) framer screws. A base layer of 5/8 inch (15.9 mm) thick type X gypsum board was screwed to the resilient channels at 12 inches (305 mm) O.C. with Steeler #6 x 1" (25.4 mm) bugle head drywall screws. A second layer of 5/8 inch (15.9 mm) thick type X gypsum board was screwed to the base layer with Steeler #10 x 1-1/2" (38.1 mm) laminating screws spaced at 12 inches (305 mm) O.C. horizontally and 24 inches (610 mm) O.C. vertically. The drywall was oriented vertically and the joints were offset. The joints and perimeter of the second layer were sealed with a bead of caulking and metal foil tape. Screw heads were covered with metal foil tape. On the receiving room side a base layer of 5/8 inch (15.9 mm) thick type X gypsum board was screwed to the metal studs at 12 inches (305 mm) O.C. with Steeler #6 x 1" (25.4 mm) bugle head drywall screws. A second layer of 5/8 inch (15.9 mm) thick type X gypsum board was screwed to the base layer with Steeler #10 x 1-1/2" (38.1 mm) laminating screws spaced at 12 inches (305 mm) O.C. horizontally and 24 inches (610 mm) O.C. vertically. The drywall was oriented vertically and the joints were offset. The joints and perimeter of the second layer were sealed with a bead of caulking and metal foil tape. Screw heads were covered with metal foil tape. Nominal 3-1/2 inch (89 mm) thick un-faced fiberglass sound insulation batts were installed in the stud space. The overall dimensions of the wall assembly were 144 inches (3.66 m) wide hy 96 inches (2.44 m) high by 6-1/2 inches (165 mm) thick. The overall weight of the assembly was estimated to be 916 lbs. (415 kg) for a calculated surface density of 9.54 lbs./ft^2 (46.6 kg/m^2).

NVLAP

SOUND TRANSMISSION LOSS TEST REPORT NO. TL06-287

CLIENT: **Steeler, Inc.**
TEST DATE: 31 July 2006

16 August 2006

RESULTS OF THE MEASUREMENTS

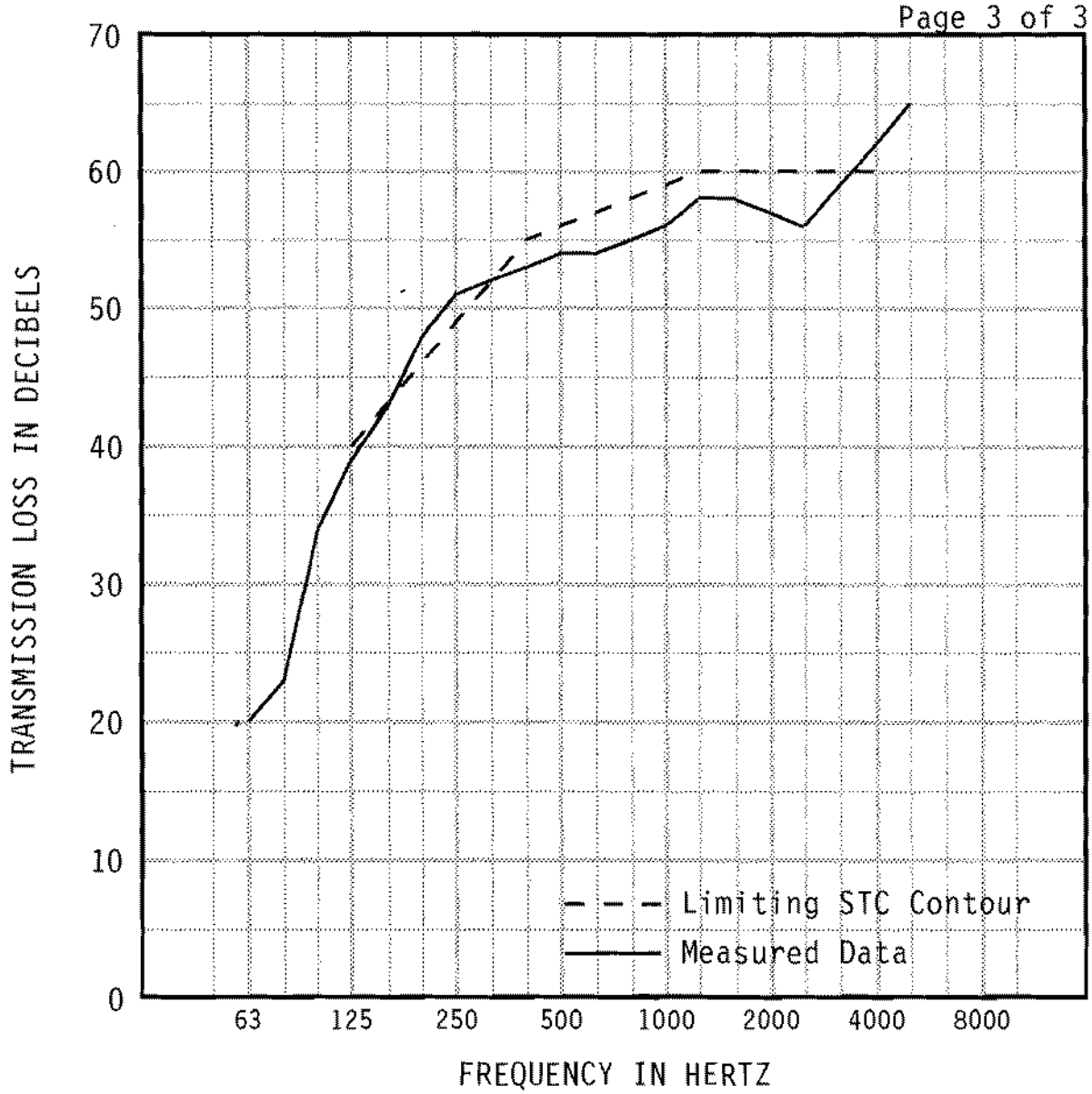
One-third octave band sound transmission loss values are plotted and tabulated on the attached sheet. ASTM minimum volume requirements are met at 80 Hz and above. The Sound Transmission Class rating determined in accordance with ASTM E 413-04 was STC-56.

Respectfully submitted,
Western Electro-Acoustic Laboratory

Gary E. Mange
Laboratory Manager

WESTERN ELECTRO-ACOUSTIC LABORATORY

Report No. TL06-287



1/3 OCT BND CNTR FREQ	63	80	100	125	160	200	250	315	400	500
TL in dB	20	23	34	39	43	48	51	52	53	54
95% Confidence in dB	1.42	1.92	2.07	1.47	0.89	0.76	0.80	0.52	0.36	0.38
deficiencies				(1)	(0)			(0)	(2)	(2)
1/3 OCT BND CNTR FREQ	630	800	1000	1250	1600	2000	2500	3150	4000	5000
TL in dB	54	55	56	58	58	57	56	59	62	65
95% Confidence in dB	0.29	0.44	0.38	0.39	0.36	0.56	0.55	0.31	0.32	0.50
deficiencies	(3)	(3)	(3)	(2)	(2)	(3)	(4)	(1)		

EWR	OITC
57	42

Specimen Area: 96 sq.ft.
Temperature: 80.1 deg. F
Relative Humidity: 57 %
Test Oate: 31 July 2006

STC
56
(26)

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