Exhibit E

POLYSONICS

Acoustics & Technology Consulting

2303 14TH ST NW

SOUND TRANSMISSION ANALYSIS

January 21, 2014

the sound of experience

POLYSONICS
Acoustics & Technology Consulting

January 21, 2014

Mr. John Cooney
JCA Architects
1801 Robert Fulton Drive, Suite 410
Reston, VA 20191
Phone Number: (703) 827-4067

2303 14th Street NW
Sound Transmission Analysis

Dear Mr. Cooney:

Polysonics has prepared this sound transmission analysis for the View 14 building located at 2303 14th St NW, in Washington, DC (the "Building"). The Building is a mixed-use project that includes ground floor retail with a 9-story apartment community above. The owner of the Building intends to lease a portion of the Building's ground floor retail space ("Retail Space 2") to the operator of a dog day care center that will include pet grooming and overnight animal boarding (the "Dog Day Care Center"). The purpose of this analysis is to determine the sound impact of the proposed Dog Day Care Center on the five apartment units directly above Retail Space 2, and base recommendations that would attenuate sound transmission from the Dog Day Care Center to the five apartment units above. As detailed below, even in the highly unlikely, worst case scenario, certain construction measures would reduce the sound levels emanating from the Dog Day Care Center such that the level of sound in the residential apartment units above continues to meet the background interior sound level standards recommended by the American Society of Heating, Refrigerating and Air Conditioning Engineers ("ASHRAE").

For your reference a list of definitions of the acoustical terms used in this report are contained in the Appendix.

PROJECT DESCRIPTION

The Dog Day Care Center is proposed to be located at the southwest corner of the Building near the intersection of Florida Avenue and 14th Street. The proposed Dog Day Care Center will consist of approximately 4,300 square feet of floor area, and is designed to include multiple "play parks" for dogs as well as rooms for pet grooming and animal boarding. There will also be a lounge for clients. The hours of operation for the facility will be 7:00 a.m. to 9:00 p.m. daily including weekends. The facility will also board dogs overnight.

Within the building, the adjacent retail space to the north is currently unoccupied. The retail space on the east of this facility is a martial arts academy. There are five (5) apartment units located directly above the proposed Retail Space 2. All other common walls are shared with a stair well and public corridors.

APPLICABLE NOISE STANDARDS

Although minimum sound transmission ratings of interior common wall and floor/ceiling assemblies are required to be implemented in residential buildings by the International Building Code (IBC), Washington DC does not regulate any noise transfer between units within the same property. The IBC states that ratings of 50 or above for both the Sound Transmission Class (STC) and Impact Insulation Class (IIC) sound tests will satisfy the minimum requirements of the IBC. The existing 7-inch post-tensioned concrete slab exceeds the IBC requirement of STC 50. IIC is not applicable to this project.

According to the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), the background interior sound levels for the apartment units on the second floor of the Building shall not exceed the overall sound pressure level of 35-40 dBA, which is equivalent to a quiet bedroom at night. This recommendation is adopted as the basis of design for this analysis.

ACOUSTICAL SURVEY

A site visit was performed on December 4, 2013, from approximately 10:30 a.m. to 11:30 a.m. The purpose of the visit was to understand the layout of this space, identify construction limitations and measure ambient noise from adjacent streets.

Polysonics measured ambient sound levels (mostly traffic and street noise) approximately 5 feet from the building facades at the intersection of Florida Avenue and 14th Street. Each second the sound level meter logged the sound level in each frequency band, as well as the A-weighted sound level. The average A-weighted sound level was measured to be 68 dBA. A total of 10 minutes of data was collected.

In addition, Polysonics performed a site visit on January 17, 2014, from approximately 10:30 a.m. to 11:00 a.m. The purpose of the visit was to measure the existing background sound levels in the apartment units 221 and 226, which are located directly over the proposed Dog Day Care Center. Sound levels were measured in the bedrooms and living rooms as a baseline. The primary existing sound source was traffic from 14th Street and Florida Avenue. The measurements were performed with the heat pump and bathroom exhaust turned off (to represent a common condition). Each second the sound level meter logged the sound level in each frequency band for a total of one minute per space, as well as the A-weighted sound level. In unit 221, the A-weighted sound level was measured to be 35 dBA in the bedroom and 37 dBA in the living room. Similarly, in unit 226, the A-weighted sound level was measured to be 45 dBA in the bedroom, 41 dBA in the living room. Unit 226 measured louder relative to unit 221 as a result of the unit's larger window line and location within the Building, as it is closer to the corner of 14th and Florida Avenue, which at the time of measurement had noises associated with traffic and construction.

EXISTING FLOOR-CEILING ASSEMBLY EVALUATION

The floor to ceiling height of Retail Space 2 is 14 feet. The ceiling of the proposed Dog Day Care Center and the floor of the residential apartment units above are currently separated by an existing 7-inch thick post-tensioned concrete slab[1]. The field test showed that the concrete slab is performing as it should with no sound leaks, except that there may be minor sound leaks at the pipe penetrations. To minimize any sound leaks resulting from slab penetrations we have included architectural details with this report.

[1] The floor-ceiling assembly performance was previously measured and documented by HUSH Acoustics LLC in their acoustical report UDR-View-12-619-1 dated November 2, 2012. In addition, we used a computer program to verify the accuracy of the measured Transmission Loss (TL) values for a 7-inch thick post tensioned concrete slab. Refer to enclosed INSUL calculation. The results were generally similar to the Apparent Transmission Loss (ATL) values measured at the site. See Figure 1 in the Appendix of this report.

NOISE LEVEL FROM DOGS

The projected noise generated from dogs barking is based on the average noise level, which was collected from several measurements on different projects, the noise source being mixed breeds of dogs of varying types (small, medium and large). This information suggests that a single dog bark measures approximately 78.0 dBA at five feet. Assuming a mixed breed of dogs barking at the same level (identical sources), a group of five dogs barking at the same time will generate approximately 85.0 dBA at five feet. Based on this value, it was calculated that a worst case noise level at a partition exposed to noise from five Play Parks, each containing 10 dogs would be approximately 95.0 dBA if all 50 dogs were barking simultaneously 100 percent of the time. Refer to Figure 2 showing noise levels used for this analysis. Although a highly unlikely scenario, this assumption was used to present a conservative analysis of worst-case noise levels.

SOUND TRANSMISSION ANALYSIS

The existing 7-inch post-tensioned concrete slab was analyzed to determine the applicable STC rating. Without any modification, the existing slab is capable of attenuating 78 dBA of sound. To attenuate our worst case sound level scenario of 95 dBA to 35 dBA, the owner/tenant must install an acoustical gypsum board ceiling isolated from the building structure on spring hangers with fiberglass insulation in the ceiling space, which is described in greater detail on the following page.

Using the recommended construction approach mentioned above, the sound transmission from the Dog Day Care Center space to units 221 and 226 were calculated. The results of this analysis are presented in Table 1 below.

Table 1– Calculated Noise Impact based on worst-case scenario

Frequency, Hz	Predicted Noise Source Level, dB	Transmission Loss values calculated using the proposed floor-ceiling assembly, dB	Predicted Receiver Level, dB
63	68.6	24.9	43.7
125	68.1	34.1	34.0
250	69.2	41.5	27.7
500	93.4	55.8	37.6
1000	91.9	70.8	21.1
2000	85.4	75.5	9.9
4000	74.6	75.8	0.0
8000	65.5	74.0	0.0
dB(A)	**95.1**	-	**34.9**

As shown in Table 1, the noise levels in the apartment units above the Dog Day Care Center are projected to be at 35 dBA, which is the existing interior background sound level measured in residential units 221 and 226 and also the recommended ASHRAE standard. As the calculated noise level in the Dog Day Care Center are assumed to be an excessive, worst-case scenario, the noise level for the adjacent spaces shown in Table 1 is rarely expected to be exceeded.

ENHANCED NOISE REDUCTION FOR FLOOR CEILING ASSEMBLY

To attenuate sound transmission from the Dog Day Care center to the residential apartment units above, we recommend the following:

- The installation of an acoustical gypsum board ceiling comprised of two layers of high-density gypsum boards suspended at least 16" from the underside of the existing PT concrete slab with the help of Kinetics ICC isolation hangers and 6" fiberglass insulation in the ceiling space.[2] Refer to enclosed details for gypsum board noise control ceiling.
- To address flanking noise concerns, minimize penetrations in the drywall ceiling by lights, electrical conduits, except for isolations hangers supporting AHUs, HVAC ducts, plumbing and piping. Penetrations made by any piping in the concrete slab shall be properly packed, caulked and sealed to prevent sound leaks.[3] Refer to enclosed architectural details to minimize any sound leaks resulting from slab penetrations.
- Install a finished ceiling with acoustical ceiling panels rated for Noise Reduction Coefficient (NRC) 0.80 and Ceiling Attenuation Class (CAC) 35; suspend it below the gypsum board ceiling by attaching metal channels to the underside of the gypsum board ceiling. The plenum between the acoustical drywall ceiling and acoustical ceiling tile can be used for return air.
- Use wall panels such as 2" MBI ColorSonix or equal mounted directly to the walls. Cover at least 50% of the available wall surface in each room for sound absorption. The panels are abuse resistant and will able to withstand the impact from dogs.

Feel free to contact me directly for any questions at 540-341-4988 Ext: 2116.

Sincerely,

Darshit Joshi
Senior Consultant

[2] The hanger spacing is dependent upon the limitations of the drywall framing. Usually a framing system of 1-1/2" CRC can be supported on 4-ft centers. That needs to be confirmed by the installer and his metal supplier. At 4-ft on centers the maximum area a hanger would see is 16-SF. In our experience the actual average area/hanger is approximately 12-SF due to edge spacing limitations, etc. If the rooms are smaller and penetrated by walls that number may go down and hanger quantity may go up. Do not frame the acoustical drywall ceiling to perimeter walls or beams; provide a ½" sponge elastomer at all edges and columns etc. The finished acoustical ceiling shall be installed below the noise control gypsum board ceiling. Do not frame the acoustical gypsum board ceiling to perimeter walls or beams; provide a ½" sponge elastomer at all edges and columns etc.

[3] Due to flanking noise concerns, we recommend minimum penetrations in the drywall ceiling by lights, electrical conduits, except for isolations hangers supporting AHUs, HVAC ducts, plumbing and piping. Penetrations made by any piping in the concrete slab shall be properly packed, caulked and sealed to prevent sound leaks. Do not penetrate this ceiling with lighting fixtures or return air. If a return air plenum is used, make it the space below this gypsum board ceiling, not above it. The ceiling height shall be adjusted to clear existing piping. Polysonics has provided CAD details to address this issue. We have also included a test report from NRC-CNRC for Kinetics Noise Control as a supporting document to our analysis.

APPENDIX

NOISE AND SOUND LEVEL DESCRIPTORS

Noise level or sound level values presented herein are expressed In terms of decibels (dB), or dBA for A-weighting, to approximate the hearing sensitivity of humans. Time-averaged noise levels are expressed by the symbol L_{EQ}, for a specified duration.

METHODOLOGY

I) Decibel Addition

To determine the combined logarithmic noise level of two or more known noise source levels, the values are converted to the base values, added together, and then converted back to the final logarithmic value, using the following formula:

$$L_c=10\log(10^{L1/10}+10^{L2/10}+\ldots 10^{Ln/10})$$

where L_c = the combined noise level (dBA), and L_n = the individual noise sources (dBA).

To approximate this equation please refer to Table 1. This procedure is also valid when used successively for each added noise source beyond the first two. The reverse procedure can be used to estimate the contribution of one source when the contribution of another concurrent source is known and the combined noise level is known. These methods can be used for L_{EQ} or other metrics (such as L_{DN}), as long as the same metric is used for all components.

Table 1 – Decibel Addition for Two Noise Sources	
Decibels Value Difference	Add to Higher Value
0-1 dB	3 dB
2·3 dB	2 dB
4-9 dB	1 dB
10 or more dB	0 dB

II) Attenuation Due To Distance

Attenuation due to distance is calculated by the equation:

$$SPL_1=SPL_2-20\log(D_2/D_1)$$

where SPL_1=Calculated sound pressure level at distance,
SPL_2=Known sound pressure level at known distance,
D_1 =Distance from source to known sound pressure level, and
D_2=Distance from source to location of calculated sound pressure level.

This is identical to the more commonly used reference of 6 dB reduction for every doubling of distance. This equation does not take into account reduction in noise due to atmospheric absorption.

III) Sound Transmission Class (STC) Ratings

Sound Transmission Class (STC) is a single number rating calculated in accordance with ASTM E413, using third-octave values of sound transmission loss. It provides an estimate of the sound performance of a partition, window, or door in sound insulation problems. Further information can be provided upon request.

Modeling of wall and floor/ceiling assemblies is accomplished using INSUL Version 6.3, which is a model-based computer program, developed by Marshall Day Acoustics for predicting the sound insulation of walls, floors, ceilings and windows. It is acoustically based on theoretical models that require only minimal material information that can make reasonable estimates of the sound transmission loss (TL) for use in sound insulation calculations; such as the design of common party walls and multiple family floor-ceiling assemblies, etc. INSUL can be used to quickly evaluate new materials or systems or investigate the effects of changes to existing designs. It models individual materials using the simple mass law and coincidence frequency approach and can model more complex assembly partitions, as well. It has evolved over several versions into an easy to use tool and has refined the theoretical models by continued comparison with laboratory tests to provide acceptable accuracy for a wide range of constructions. INSUL model performance comparisons with laboratory test data show that the model generally predicts the performance of a given assembly within 3 STC points.

IV) Interior-to-Interior Noise Transmission

According to the Handbook of Acoustical Measurements and Noise Control by Cyril M. Harris, sound transmission between rooms, through a common partition, can be calculated using the equation:

$$L_R = L_S - TL - I0\log(S - A_R)$$

Where L_R=Calculated sound pressure level in receiving room,
L_s=Known sound pressure level in the source room,
TL=The frequency specific transmission loss of the partition,
S=The surface area of the common partition, and
A_R=The frequency specific absorption value in the receiving room.

This equation is applied to each octave band level. The octave bands are then A-weighted and summed together to provide a broadband noise level. Further information is available upon request.

DEFINITION OF ACOUSTICAL NOISE TERMS

* Acoustics – The science of sound.
* Noise - a sound, especially one that is loud or unpleasant or that causes disturbance.
* Ambient Noise – the composite of airborne sound from many sources near and far associated with a given environment.
* Direct Sound – Sound that is emitted from the noise source, not including any reflected sound.
* Reflected Sound – Sound that has been bounced off of sound-reflecting surfaces.
* Decibel (dB) – A logarithmic scale of sound level.
* A-Weighted Sound Level (dBA) – The sound level in decibels using a frequency filter similar to human hearing. Sound levels measured with this filter are designated dB(A).
* Sound power level (L_w) – of airborne sound, ten times the common logarithm of the ratio of the sound power under consideration to the standard reference power of 1 pW. It is expressed in decibels.
* Sound Pressure Level (SPL) or (L_p) – The average (RMS) pressure level of sound waves at a particular point equal to 20 times the log of the of the measured RMS pressure divided by the reference pressure which is 20 micropascals.

$$SPL = 20 \log \frac{SPL}{SPL\ (reference)}$$

* Leq – Leq is the preferred method to describe sound levels that vary over time, resulting in a single decibel value which takes into account the total sound energy over the period of time of interest.
* Lpeak – The peak level of the sound pressure wave measured during some specified time period with no time constant applied.
* L_{max} – The maximum RMS sound pressure level measured during some given time period with a time constant applied (Fast or Slow).
* L_{min} – The minimum RMS sound pressure level measured during some given time period with a time constant applied (Fast or Slow).
* L_{10} – The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
* L_{90} – The noise level exceeded 90% of the time period measured. Generally considered the ambient or background noise level of a location.
* Sound Transmission Class (STC) – A rating system for noise reduction through partitions. It is a unit less rating.
* Apparent Transmission Loss (ATL) – The difference in sound levels in a single frequency band between the retail space and residence above is called the Noise Reduction (NR). When the NR values are adjusted considering the floor area of the upper room, and the amount of sound absorbing materials in that upper room, the adjusted difference in sound levels between the two rooms is called the Apparent Transmission Loss (ATL). ATL values are essentially a property of the floor-ceiling assembly, and can be compared to Transmission Loss (TL) values measured in a laboratory or predicted with a computer model.

Sound Insulation Prediction (v6.3)

Margin of error is generally within +/- 3STC

Job Name:2303 14th Street NW

Notes:

Job No.:

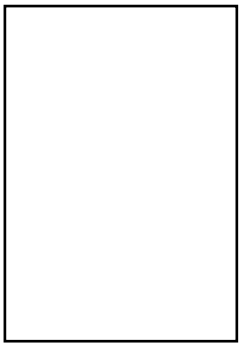
Page No.:

7-thick concrete slab (Normal weight)

Date: 16 Jan 14

Initials:DJ

File Name: 7-inch thick concrete slab.ins



STC 57

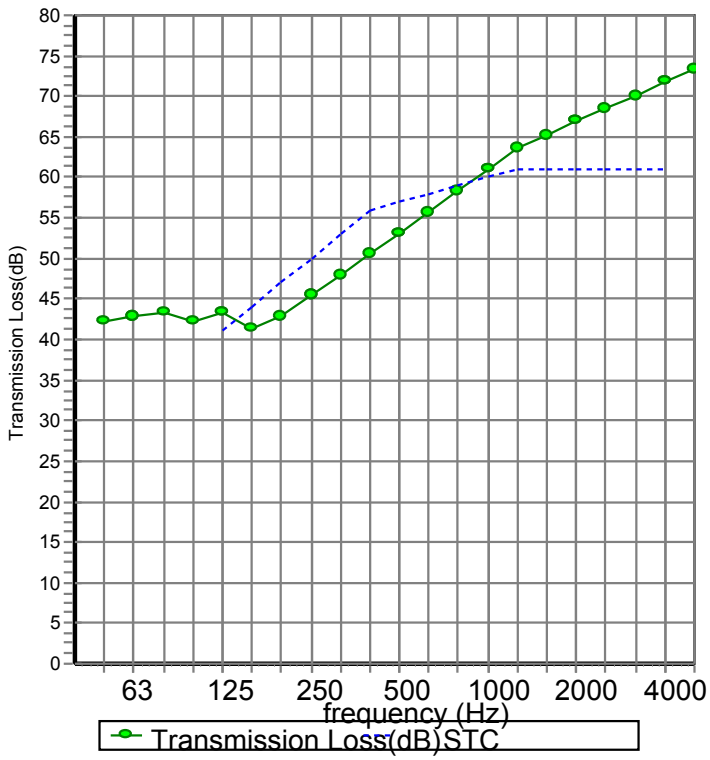
OITC 50

System description

Panel 1 Outer layer: 1 x 7.00 in Concrete (m=85.21 lb/ft2, fc=168 Hz, damping=0.01)

Panel Size 8.9x13 ft

frequency (Hz)	TL(dB)	TL(dB)
50	42	
63	43	43
80	43	
100	42	
125	43	42
160	41	
200	43	
250	45	45
315	48	
400	51	
500	53	53
630	56	
800	58	
1000	61	60
1250	64	
1600	65	
2000	67	67
2500	68	
3150	70	
4000	72	72
5000	73	



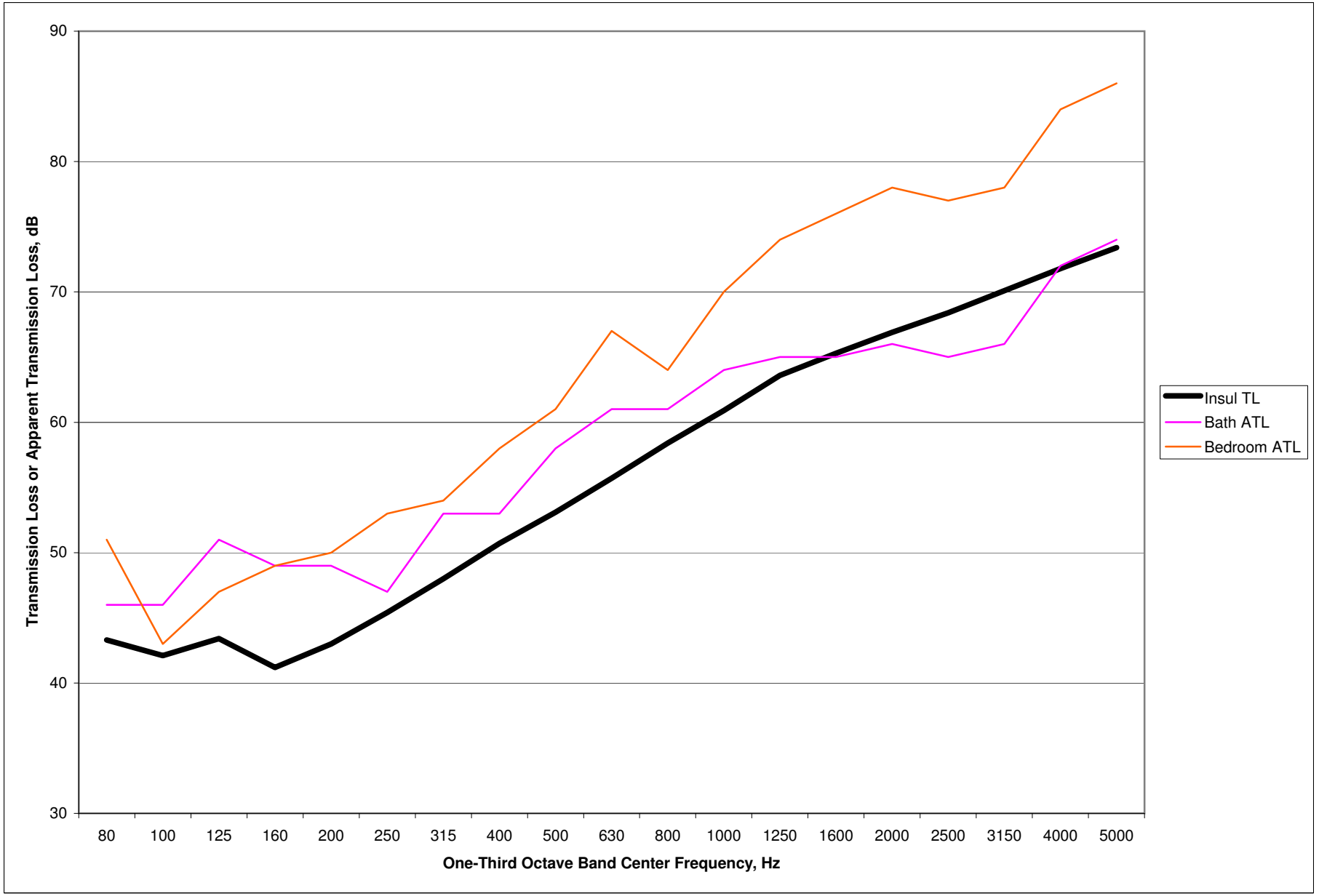


Figure 1: Measured and Calculated TL comparison
(HUSH Acoustics)

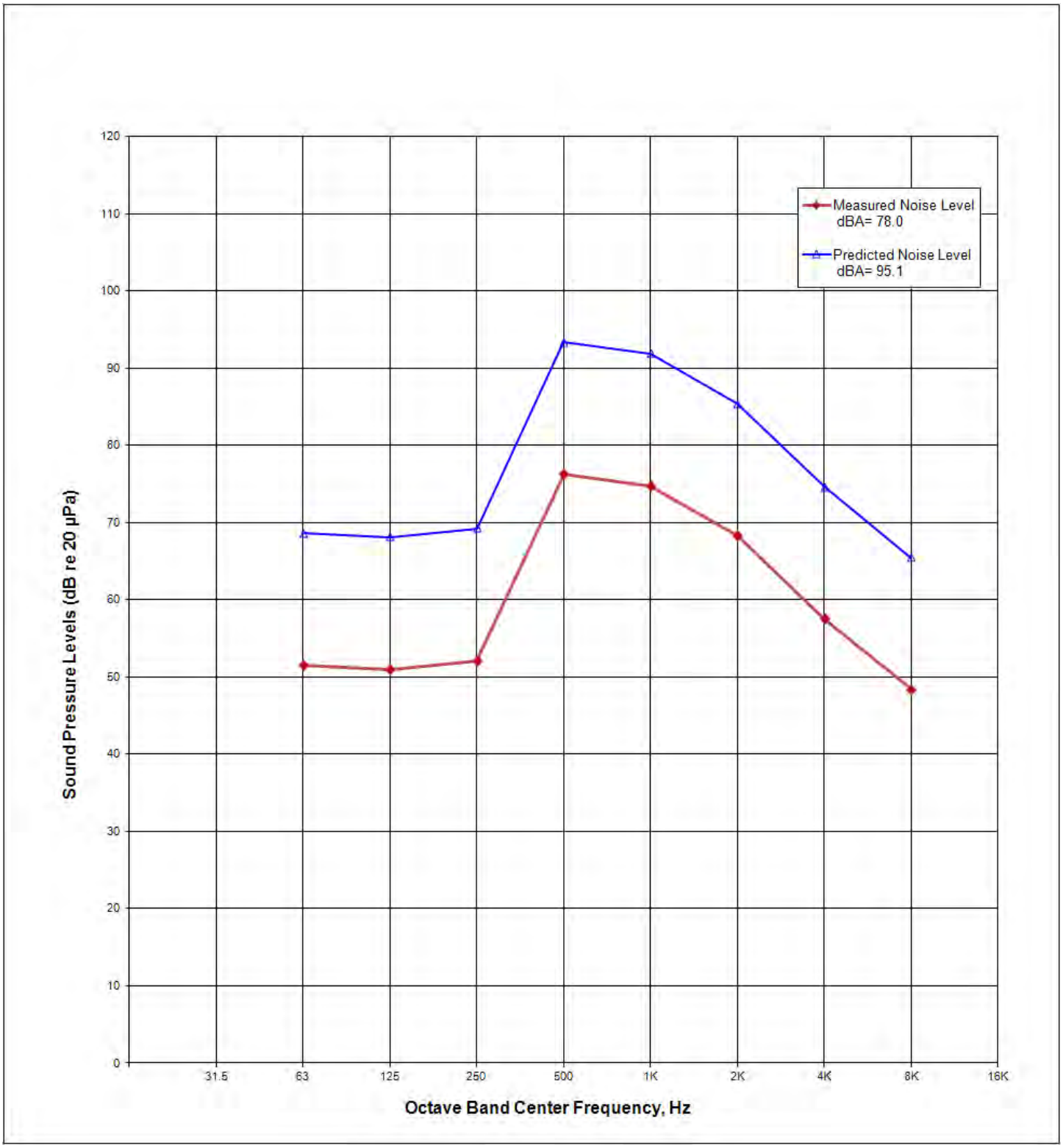
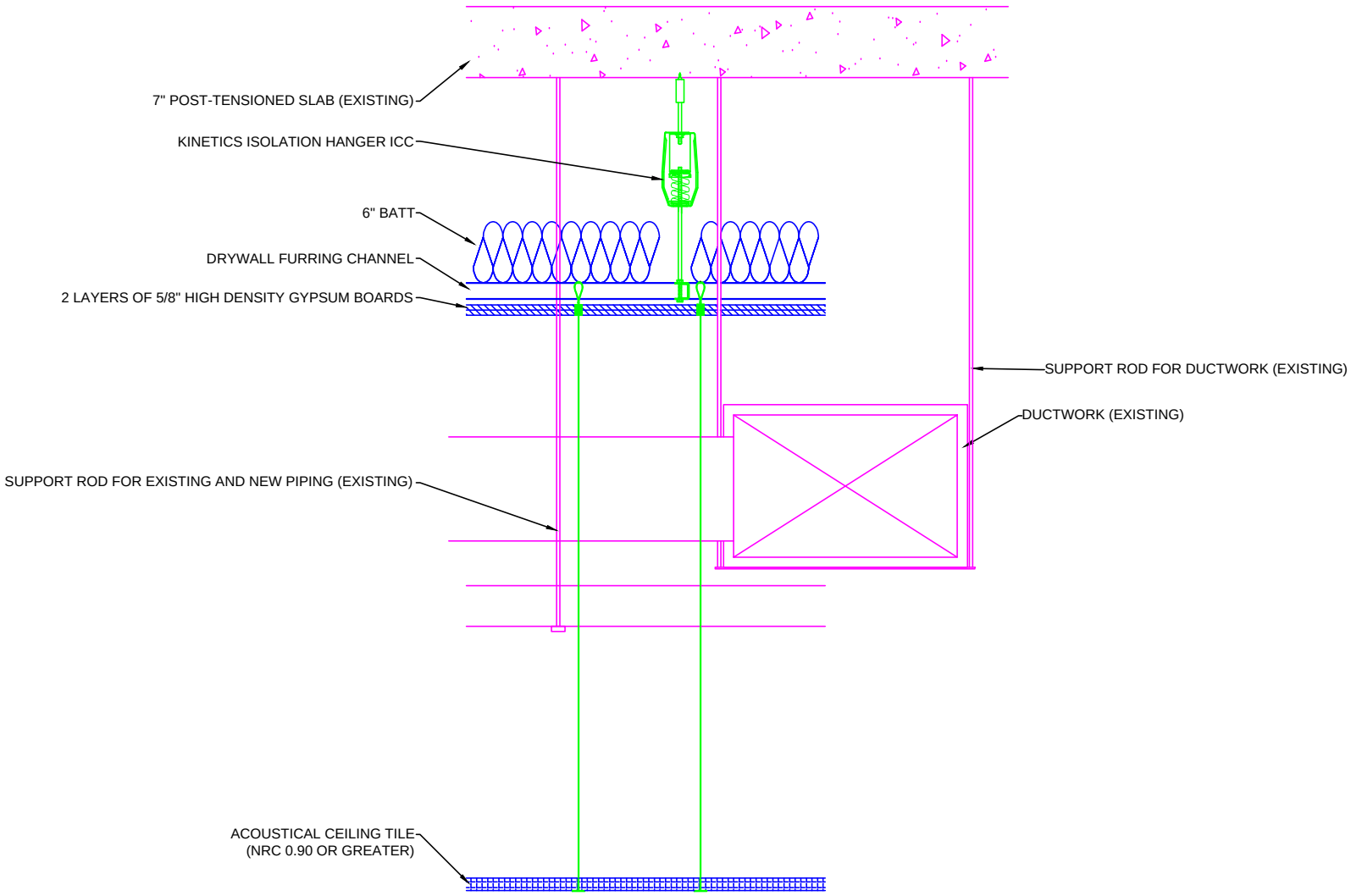


Figure 2: Noise Levels from Dogs



POLYSONICS
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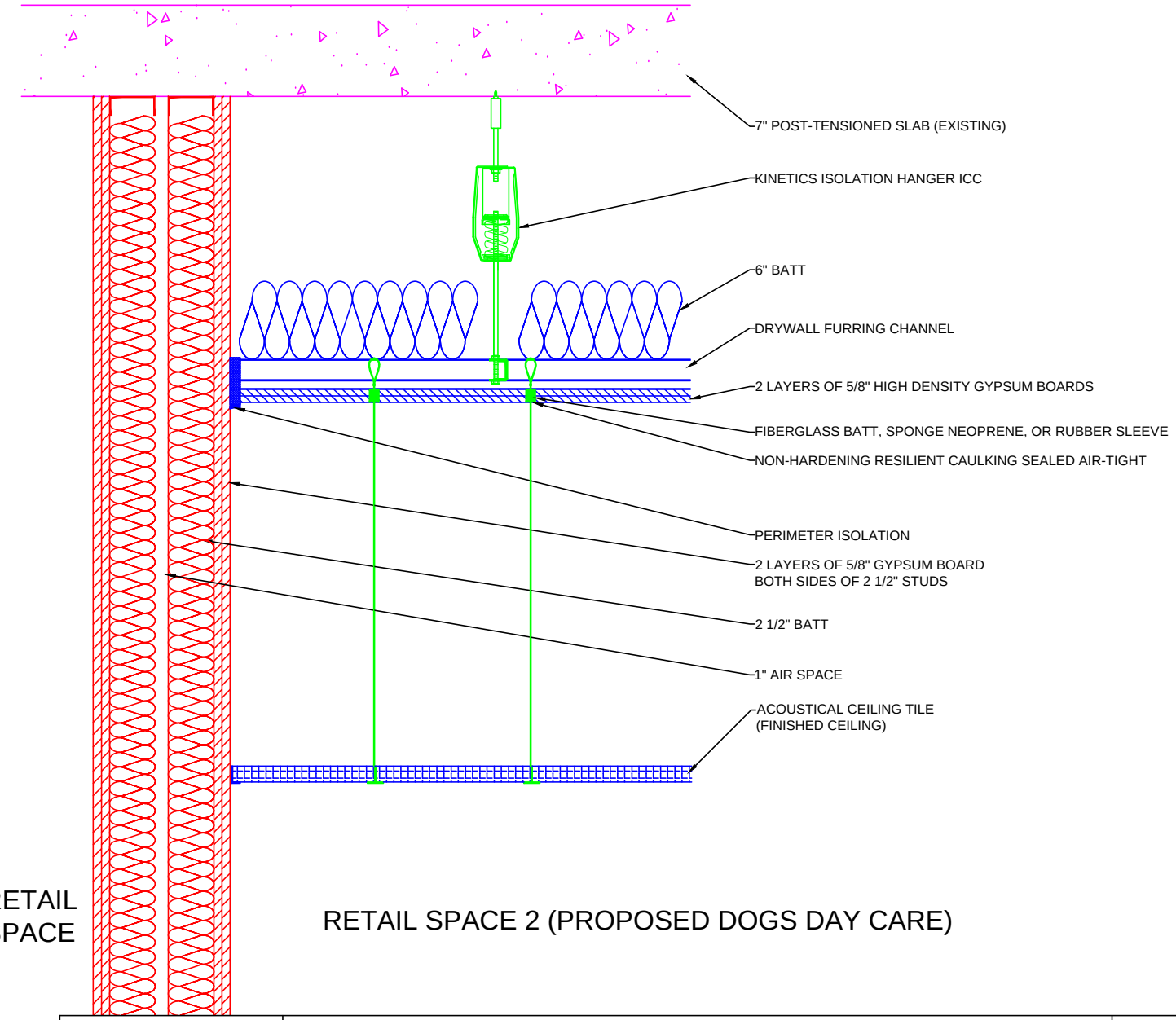

RETAIL SPACE 1

RETAIL SPACE 2 (PROPOSED DOGS DAY CARE)

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TASK ORDER: -	TITLE: TYPICAL WALL AND CEILING ISOLATION- CONDITION 1	DATE: 01/17/2014
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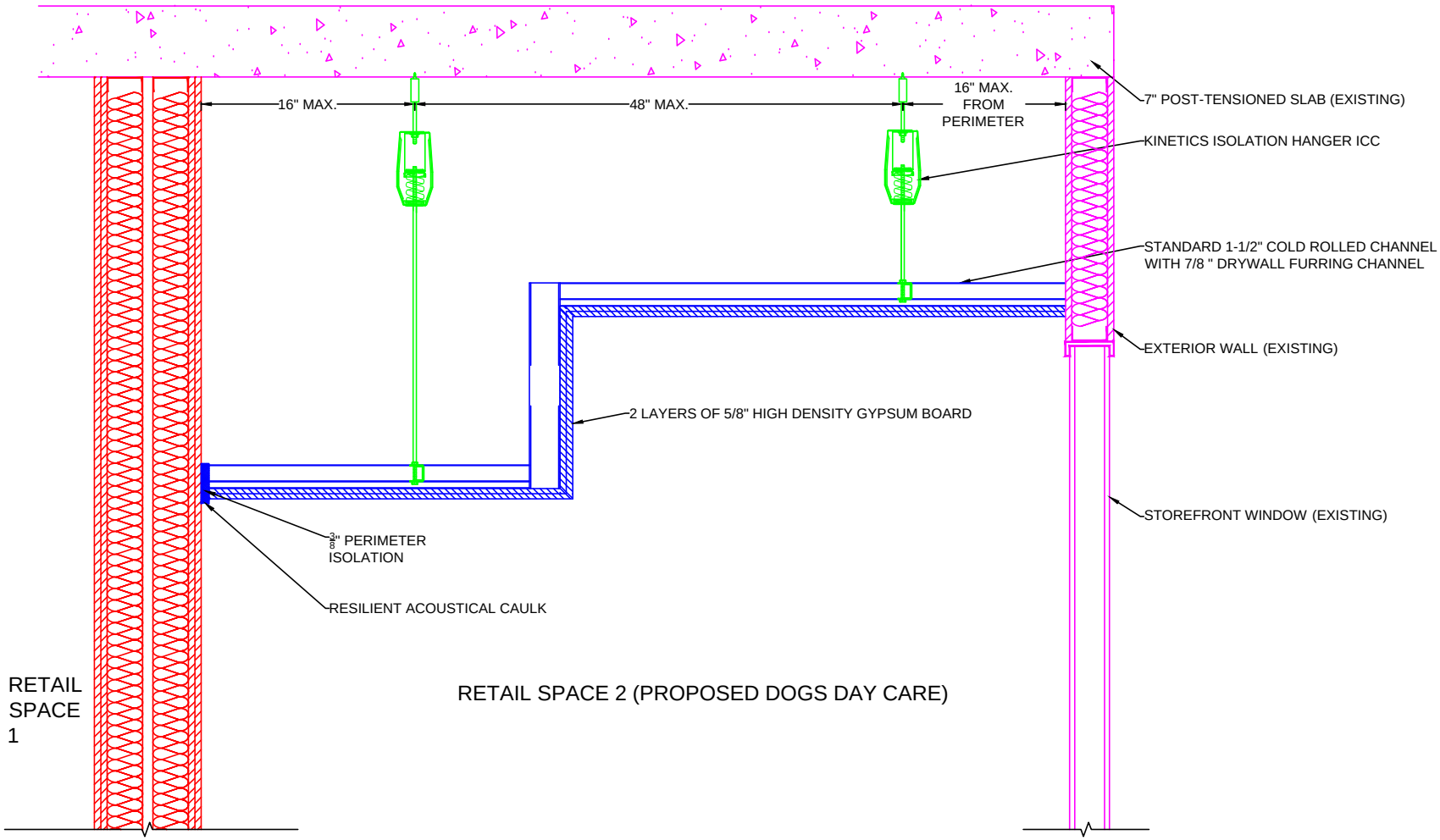

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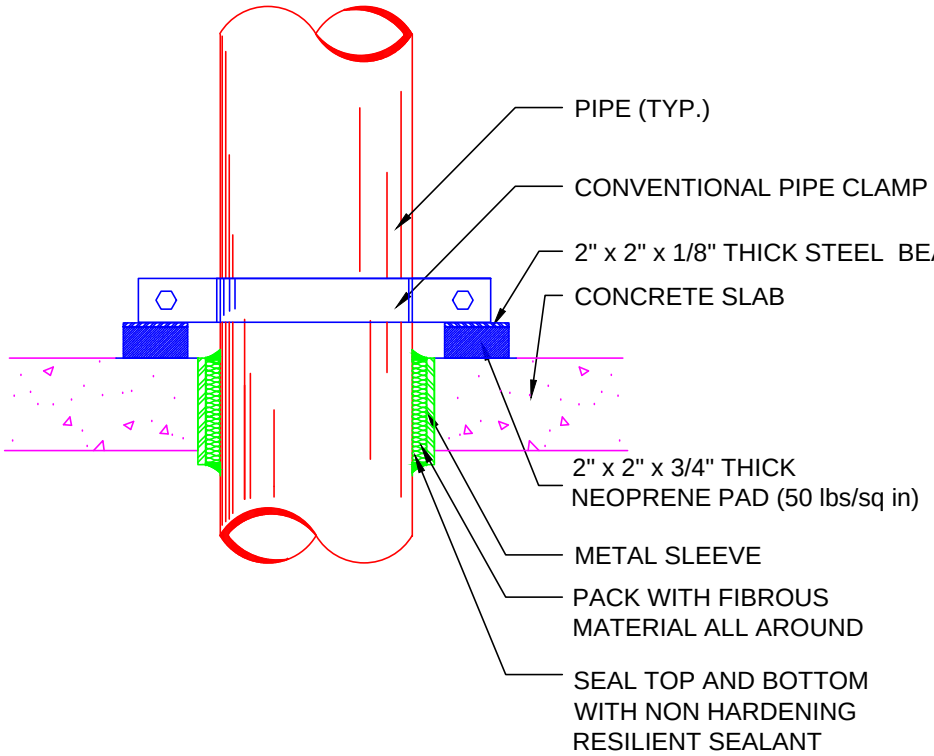

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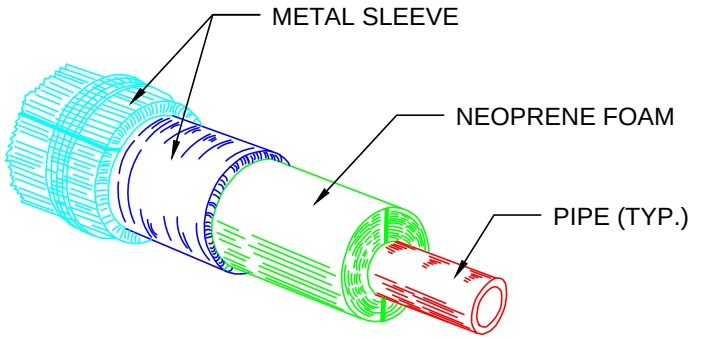

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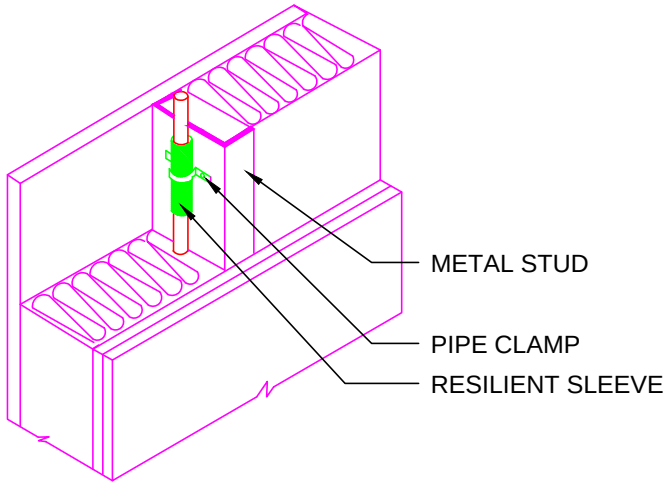

PLUMBING NOISE CONTROL DETAIL -3

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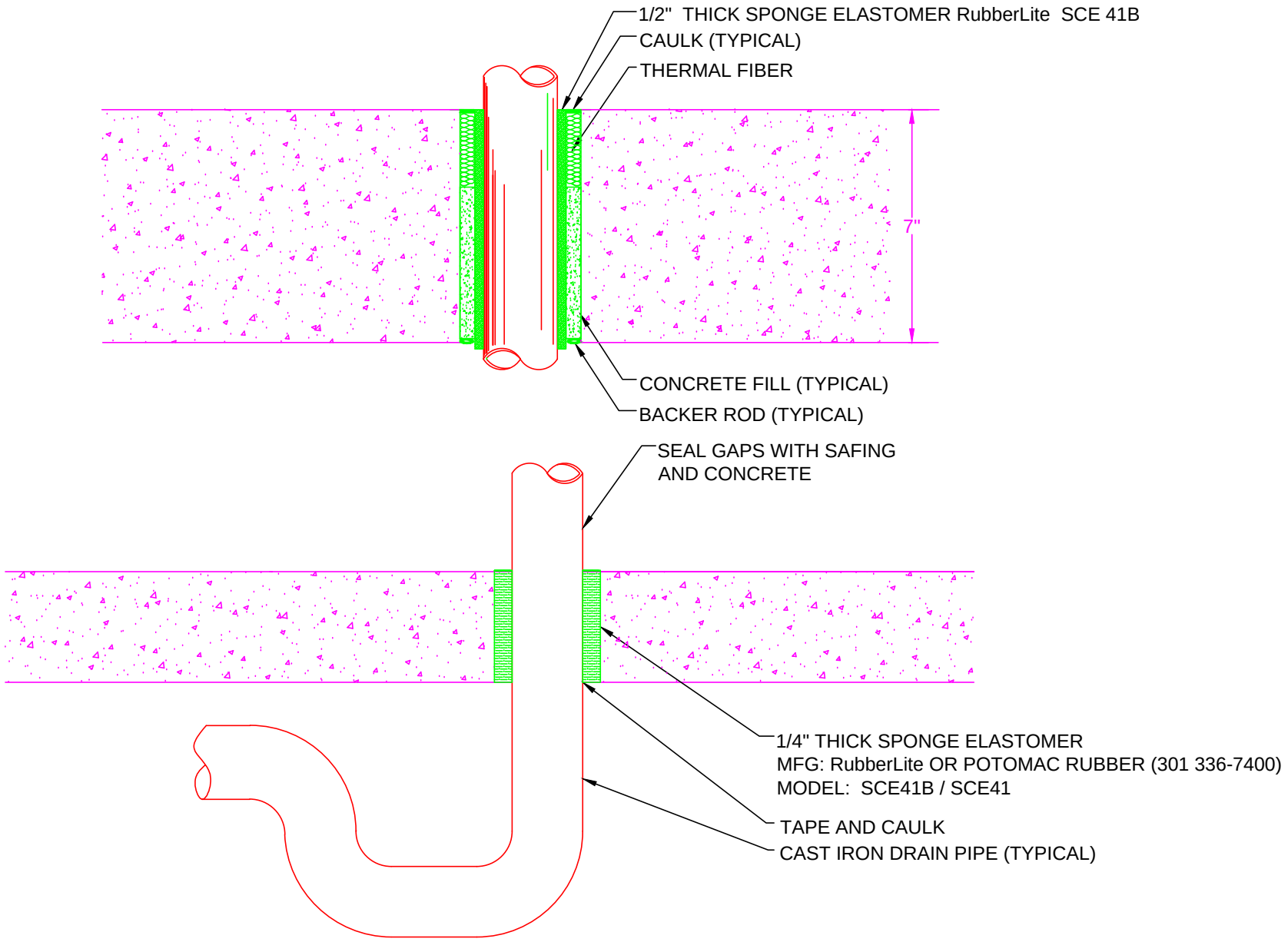

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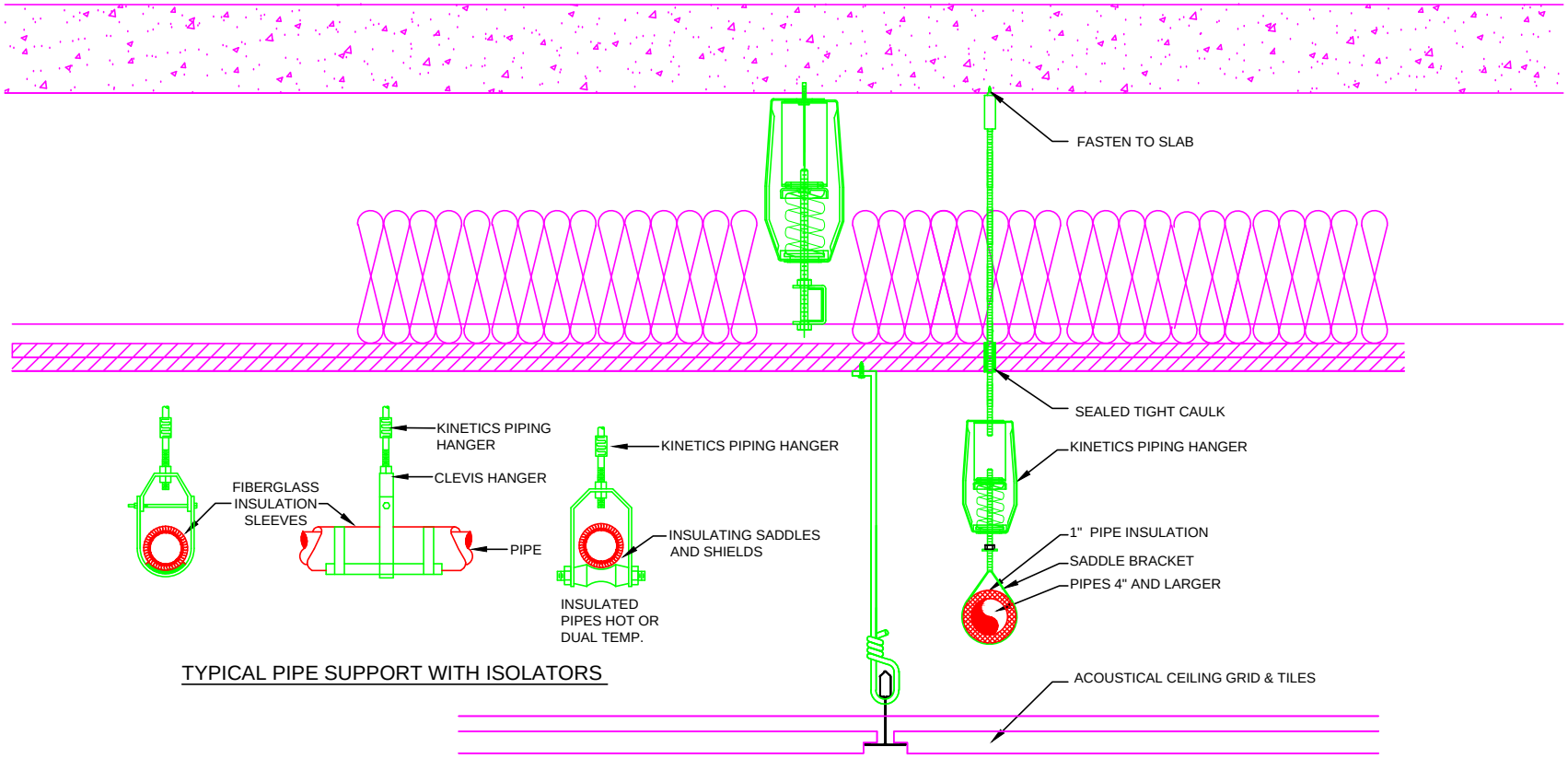

TYPICAL PIPE SUPPORT WITH ISOLATORS

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TASK ORDER: -	TITLE: TYPICAL CEILING PIPING ISOLATION	DATE: 01/17/2014
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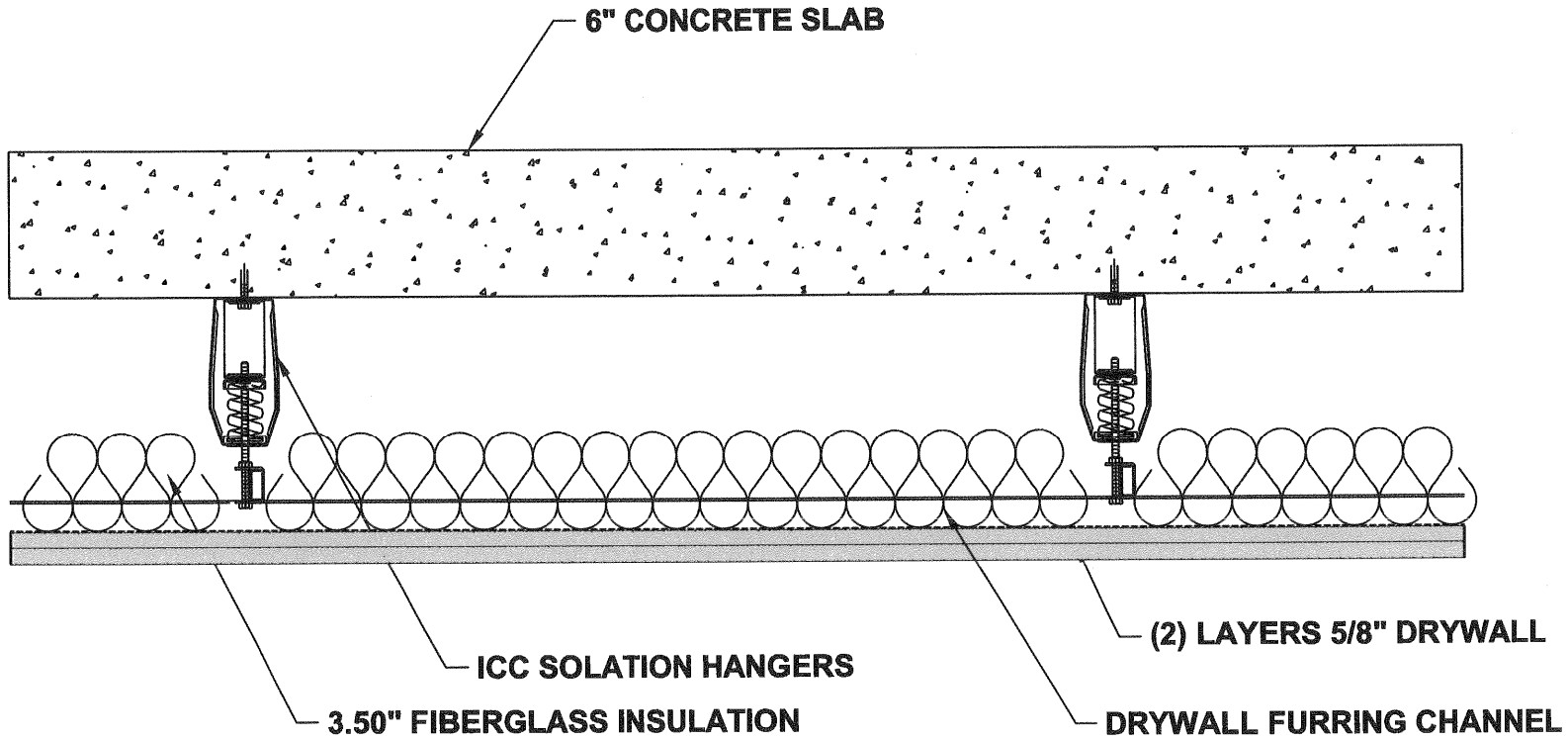
STC 84
IIC 70



KINETICS Noise Control	TITLE	LAST DATE REVISED	REVISED BY	DRAWING NO.
	TEST A13-d	11-8-04	JAE	A13-d

National Research Council of Canada

Client Report

B-3448.12

Airborne Sound Transmission Loss, Impact Sound Transmission and Special Impact Tests Measurements Performed on One (1) Floor Assembly

for

Kinetics Noise Control
6300 Ireland Place
Dublin, OH, USA
43017-0655

01 May 2007

Airborne Sound Transmission Loss, Impact Sound Transmission and Special Impact Tests Measurements Performed on One Floor Assembly for Kinetics Noise Control

Author

N.L. Brunette

Quality Assurance

J.D. Quirt, Ph.D.
Group Leader

Approved

M.R. Atif, Ph.D.
Director, Indoor Environment

Report No: B3448.12
Report Date: May 1, 2007
Contract No: B3448
Reference: Agreement dated June 28, 2006
Program: Indoor Environment

18 pages
Copy No. 1 of 4 copies

INTRODUCTION

Airborne and impact sound transmission measurements were performed on one floor assembly. Special impact tests (tire, walker and ball) were also performed. For report purposes, the floor is identified as Floor "D". Please note that this floor assembly was tested under contract A1068, but an individual report for this specimen was not requested or issued as part of that contract.

SPECIMEN DESCRIPTION

Construction on the series of floor assemblies for this contract started in November 1995 and concluded in March 1996. The airborne and impact sound transmission loss tests for this floor assembly were performed on February 27th, 1996.

Floor "D"

The top layer of Floor "D" comprised the 150 mm reference concrete slab, provided by NRC, which was installed in the floor test frame. The perimeter of the reference concrete slab is sealed at the top with insulation and covered with metal tape and at the bottom with mortite then covered with metal tape. The density of the concrete slab is 2446 kg/m^3.

The bottom layer of Floor "D" had two layers of gypsum board hung on an ICC hanger system. The system, provided by the client, comprised fourteen ICC-50 hanger brackets, six ICC-100 hanger brackets, 16 gauge steel rails (0.52 kg/m) and 20 gauge steel furring channels (0.46 kg/m). The ICC hanger brackets were on 1.20 m centers. The 20 gauge furring channels ran perpendicular to the 16 gauge steel rails. The base layer of gypsum board was attached perpendicular to the 20 gauge furring channels and was screwed to the furring channels on 300 mm centers. The face layer of gypsum board was attached parallel to the furring channels and screwed 600 mm on center.

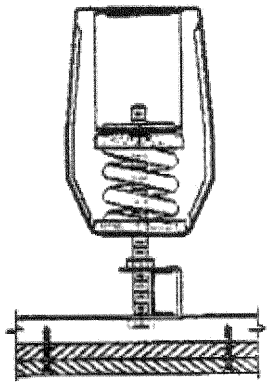


Figure 1: Sketch, provided by the client, of an ICC hanger.

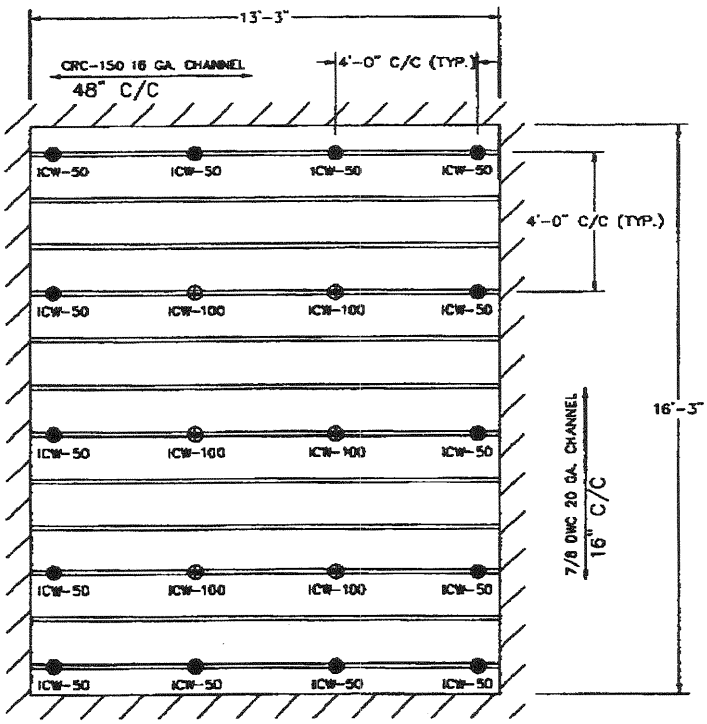


Figure 2: Diagram of the layout of the ICC hangers 16 gauge channel and 20 gauge channel. This drawing was provided by the client.

The following table gives the elements of the specimen, listed from top to bottom.

Table 1: Element breakdown of Floor "D".

Element	Surface weight (kg/m^2)	Mass (kg)
150 mm concrete slab	356	7,030
Kinetics ICC ceiling isolation hangers		18
16 gauge steel rails (5 pieces used)		10
25 mm 20 gauge furring channels (10 pieces used)		22
90 mm R12 glass fibre batts	1.0	19
15.9 mm Type X gypsum board	11.3	202
15.9 mm Type X gypsum board	11.3	202
TOTAL	**379.6**	**7,503**

Measured total thickness: 512 mm

The test specimen was mounted in the IRC acoustical floor test opening which measures 4.70 m x 3.78 m. The area used for the calculations of impact transmission and airborne sound transmission loss was 17.85 m^2.

RESULTS

Results of the airborne sound transmission loss measurements of Floor "D" are given in Table 2 and Figure 3. Results of the impact sound transmission measurements of this floor construction are given in Table 3 and Figure 4. Results of the special measurements are given in Table 4, 5, 6 and Figure 5, 6 and 7.

Values marked "**" indicate that the measured background level was less than 5 dB below the combined receiving room level and background level. The reported values provide an estimate of the lower limit of airborne sound transmission loss or impact transmission. These values do not limit the sound transmission class.

The Tables also give the 95% confidence limits. Acoustical measurement in rooms is a sampling process and as such has associated with it a degree of uncertainty. By using enough microphone and loudspeaker positions, the uncertainty can be reduced and upper and lower limits assigned to the probable error in the measurement. These limits are called 95% confidence limits. They are calculated for each test according to the procedures in ASTM E90 and E492 and must be less than upper limits given in the standards. These confidence limits do not relate directly to the variation expected when a nominally identical specimen is built, installed and tested (repeatability). Nor do they relate to the differences expected when nominally identical specimens are tested in different laboratories (reproducibility).

Table 2: Airborne sound transmission loss measurements of Floor "D", TLF-96-030.

Frequency (Hz)	Airborne Sound Transmission Loss (dB)	95% Confidence Limits*	Deviation Below the STC Contour
80	57	±2.7	
100	61	±1.3	
125	63	±1.5	-5
160	65	±0.8	-6
200	66	±0.7	-8
250	72	±0.6	-5
315	72	±0.8	-8
400	83	±0.7	
500	84	±0.6	
630	87	±0.9	
800	91	±0.4	
1000	91	±0.5	
1250	96	±0.9	
1600	104	±0.7	
2000	104	±0.6	
2500	105	±0.2	
3150	105**	±0.2	
4000	105**	±0.3	
5000	105**	±0.4	
Sound Transmission Class (STC)[1] = 84			
Weighted Sound Reduction (R_W)[2] = 84			

[1] Sound Transmission Class (STC) calculated according to ASTM E413.

[2] Weighted Sound Reduction (R_w) calculated according to ISO 717.

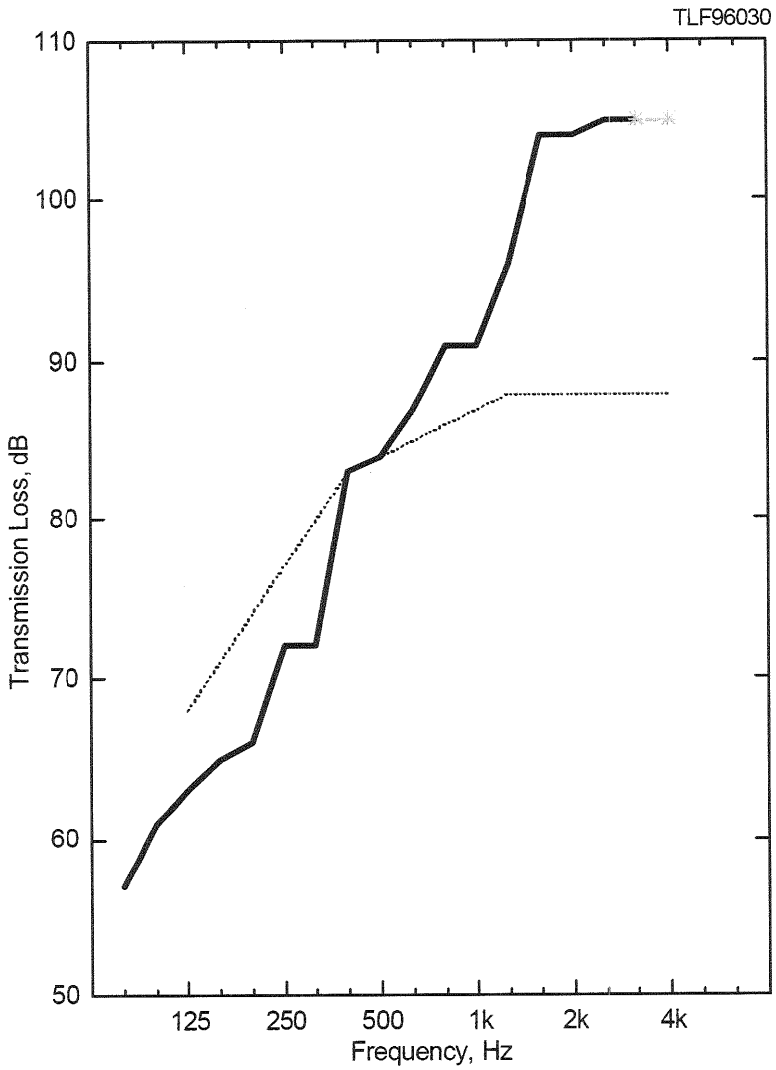


Figure 3: Airborne sound transmission loss measurements of Floor "D". The solid line is the experimental data, the dotted line is the STC 84 contour and the line with asterisks is the lower limit of the airborne sound transmission loss.

Table 3: Impact sound transmission measurements of Floor "D", IIF-96-006.

Frequency (Hz)	Impact Sound Transmission Loss (dB)	95% Confidence Limits*	Deviation Below the IIC Contour
80	44	±0.9	
100	42	±0.6	
125	42c	±0.8	
160	43	±0.3	-1
200	44	±0.4	-2
250	41	±0.2	
315	45	±0.5	-3
400	37	±0.2	
500	40	±0.2	
630	38	±0.2	
800	39	±0.1	-1
1000	41	±0.2	-4
1250	36	±0.2	-2
1600	29	±0.1	
2000	29	±0.1	-1
2500	32	±0.1	-7
3150	29	±0.1	-7
4000	24	±0.2	
5000	19c	±0.2	
Impact Insulation Class (IIC)[3] = 70			
Weighted Normalized Impact Sound Pressure Level ($L_{n,w}$)[4] = 40			

[3] Impact Insulation Class (IIC) calculated according to ASTM E989.

[4] Weighted Normalized Impact Sound Pressure Level ($L_{n,w}$) calculated according to ISO 717.

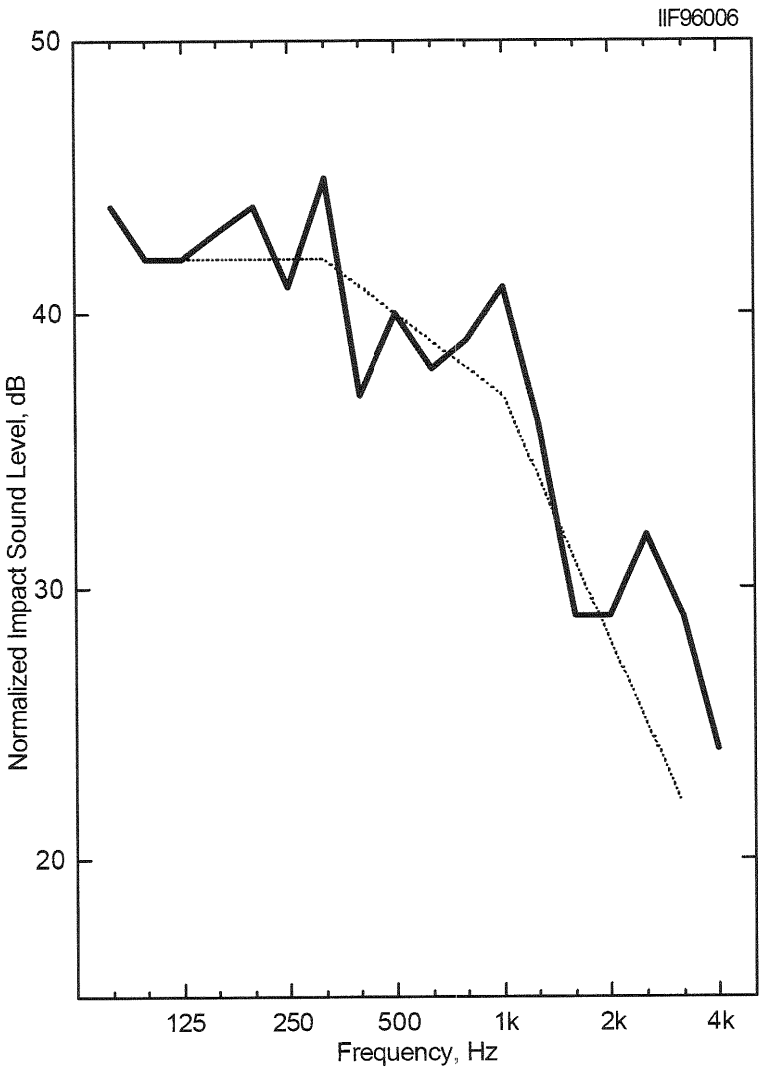


Figure 4: Impact sound transmission measurements of Floor "D". The solid line is the experimental data and the dotted line is the IIC 70 contour.

Table 4: Peak impact insulation measurements, using Tachibana's ball, of Floor "D", BBF-96-006.

Frequency (Hz)	Impact Sound Pressure Level (dB)
12.5	57
16	64
20	86
25	91
31.5	82
40	69
50	61
63	64
80	65
100	62
125	49
160	41
200	39
250	36
315	34
400	27
500	25
630	22

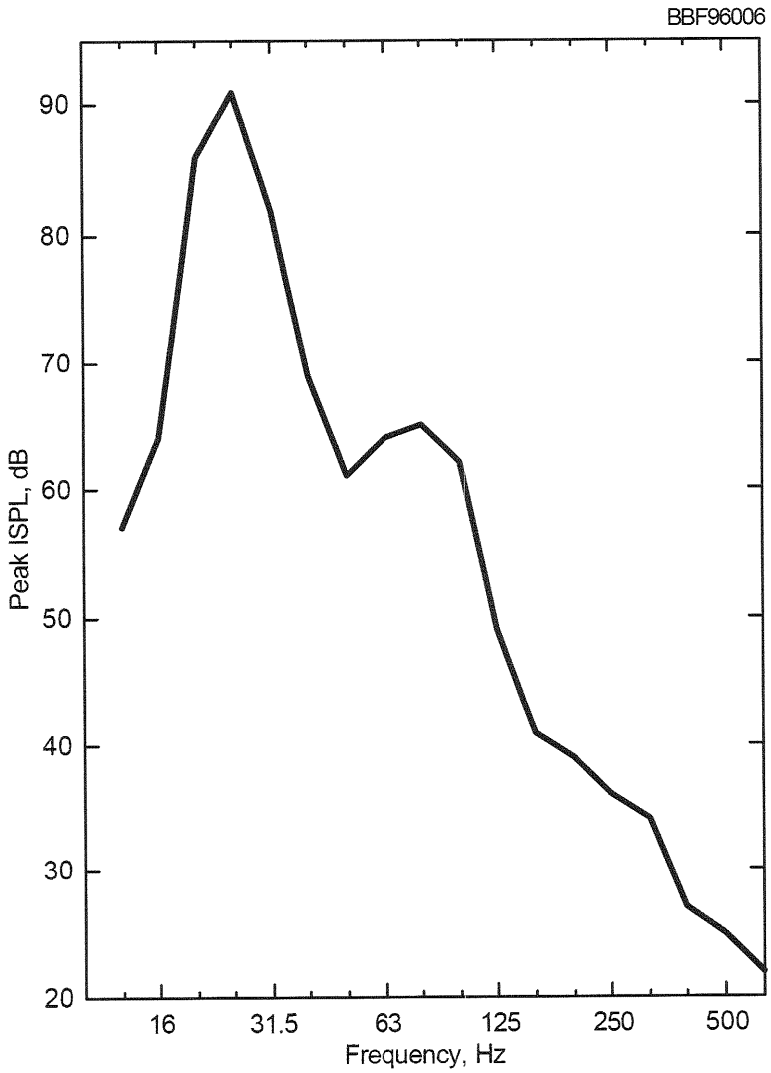


Figure 5: Peak impact insulation measurements, using Tachibana's ball, of Floor "D".

Table 5: Peak impact insulation measurements, using the tire machine, of Floor "D", TYF-96-006.

Frequency (Hz)	Impact Sound Pressure Level (dB)
12.5	66
16	71
20	93
25	97
31.5	88
40	74
50	63
63	61
80	55
100	50
125	39
160	37
200	34
250	30
315	28
400	26
500	26
630	26

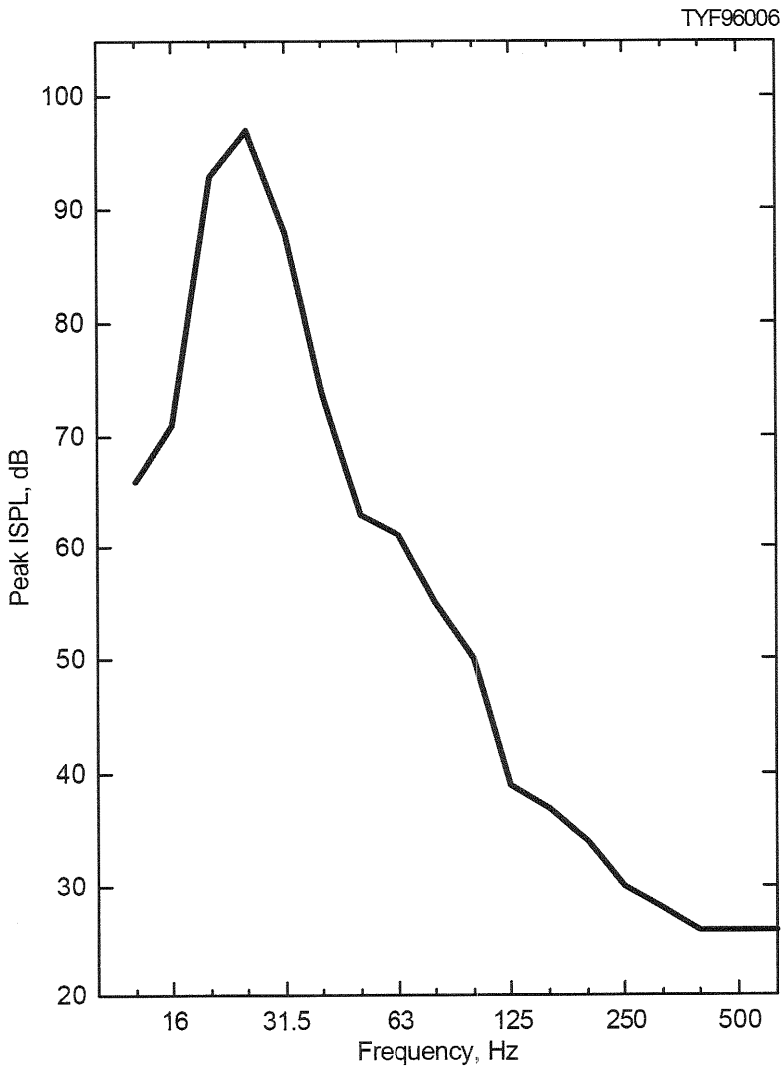


Figure 6: Peak impact insulation measurements, using the tire machine, of Floor "D".

Table 6: Peak impact insulation measurements, using the live walker, of Floor "D", WMF-96-006.

Frequency (Hz)	Impact Sound Pressure Level (dB)
12.5	44
16	42
20	62
25	68
31.5	59
40	43
50	37
63	30
80	32
100	27
125	28
160	21
200	19
250	19
315	17
400	12
500	10
630	9

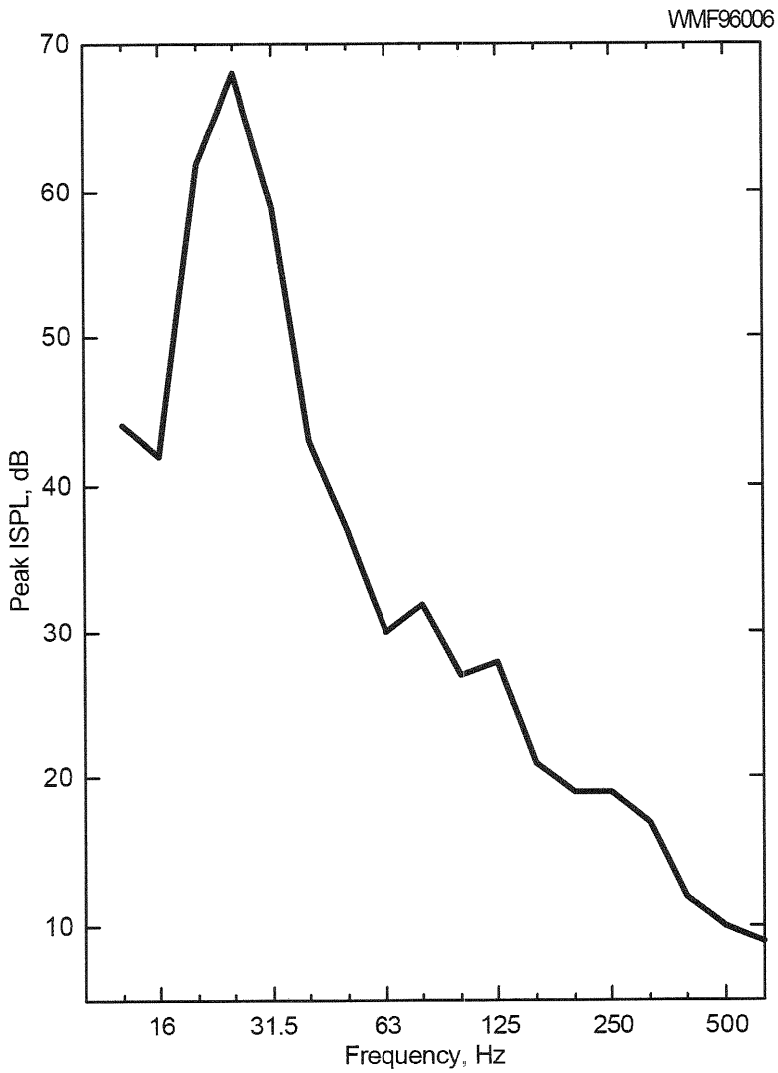


Figure 7: Peak impact insulation measurements, using the live walker, of Floor "D".

NOTES ON THE SIGNIFICANCE OF TEST RESULTS

Sound Transmission Class And Weighted Sound Reduction Index

The Sound Transmission Class (STC) and Weighted Sound Reduction Index (R_w) are single-figure rating schemes intended to rate the acoustical performance of a partition element under typical conditions involving office or dwelling separation. The higher the value of either rating, the better the floor performance. Thus, the rating is intended to correlate with subjective impressions of the sound insulation provided against the sounds of speech, radio, television, music, office machines and similar sources of noise characteristic of offices and dwellings. In applications involving noise spectra that differ markedly from those referred to above (for example, heavy machinery, power transformers, aircraft noise, motor vehicle noise), the STC and R_w are of limited use. Generally, in such applications it is desirable to consider explicitly the noise spectra and the insulation requirements.

Impact Insulation Class And Weighted Normalized Impact Sound Pressure Level

The Impact Insulation Class (IIC) (ASTM E989) and the Weighted Normalized Impact Sound Pressure Level ($L_{n,w}$) (ISO 717-2) are single-figure rating schemes intended to rate the effectiveness of floor-ceiling assemblies at preventing the transmission of impact sound from the standard tapping machine. The higher the value of the rating, the better the floor performance.

The ASTM E989 and the ISO 717 rating curves are identical. The major difference in the fitting procedure is that the ISO standard allows unfavorable deviations to exceed 8 dB; the ASTM E989 standard does not. When this 8 dB requirement is not invoked, the two ratings are related by the equation

$$IIC = 110 - L_{n,w}$$

Extended Frequency Range

Standard test procedures require measurements in 1/3-octave bands over a specified frequency range (125 to 4000 Hz for ASTM E90 and 100 to 3150 Hz for ASTM E492). Within those ranges, reproducibility has been assessed by inter-laboratory round robin studies. The standards recommend making measurements and reporting results over a larger frequency range, and this report presents such results, which may be

useful for expert evaluation of the specimen performance. The precision of results outside the standard ranges has not been established, and is expected to depend on laboratory-specific factors such as room size and specimen dimensions.

FACILITIES AND EQUIPMENT

The acoustics floor test facility comprises two reverberation rooms with a moveable test frame between the two rooms. Both rooms have a volume of 175 m^3.

Measurements are controlled by a desktop PC-type computer interfaced to a Norwegian Electronics type 830 real time analyser. Each room has a calibrated Bruel & Kjaer condenser microphone with a type 4166 cartridge that is moved under computer control to nine positions used for the acoustical measurements. Each room has four loudspeakers driven by separate amplifiers and noise sources. To increase the randomness of the sound field, there are also fixed diffusing panels in each room.

TEST PROCEDURE

Airborne Sound Transmission Loss

Airborne sound transmission measurements were conducted in accordance with the requirements of ASTM E90, "Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions", and of ISO 140-3, "Laboratory Measurement of Airborne Sound Insulation of Building Elements".

The Sound Transmission Class (STC) was determined in accordance with ASTM E413, "Classification for Rating Sound Insulation". The Weighted Sound Reduction Index (R_w) was determined in accordance with ISO 717-1, "Rating of Sound Insulation in Buildings and of Building Elements, Part 1: Airborne Sound Insulation".

One-third octave band sound pressure levels were measured for 30 seconds at each microphone position in each room and then averaged to get the average sound pressure level in the room. Five sound decays were averaged to get the reverberation time at each microphone position in the receiving room. These times were averaged to get the average reverberation times for the room.

The average sound pressure levels of both the source and receiving rooms and the average reverberation times of the receiving room were used to calculate sound transmission loss values.

Airborne sound transmission loss tests were performed in the forward (receiving room is the lower room) and reverse (receiving room is the upper room) directions. Results presented in this report are the average of the tests in these two directions.

A complete description of the test procedure, information on the flanking limit of the facility and reference specimen test results are available on request.

Impact Sound Transmission

Impact sound transmission measurements were made in accordance with ASTM E492, "Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine". This test used the standard tapping machine and the prescribed four impact positions on the floor. The Impact Insulation Class (IIC) was determined in accordance with ASTM E989, "Standard Classification for Determination of Impact Insulation Class (IIC)".

These measurements are also in accordance with ISO 140-6, "Laboratory Measurements of Impact Sound Insulation of Floors", except that the tapping machine positions are not randomly selected. This difference is believed to be insignificant. The Weighted Normalized Impact Sound Pressure Level ($L_{n,w}$) was determined in accordance with ISO 717-2, "Acoustics — Rating of Sound Insulation in Buildings and of Building Elements - Part 2: Impact Sound Insulation".

One-third octave band sound pressure levels were measured for 30 seconds at each microphone position in the receiving room and then averaged to get the average sound pressure level in the room. Five sound decays were averaged to get the reverberation time at each microphone position in the receiving room. These times were averaged to get the spatial average reverberation times for the room.

The space average sound pressure levels and the spatial average reverberation times of the receiving room were used to calculate impact transmission values. For impact sound transmission, the lower room is the receiving room.

A complete description of the test procedure is available on request.

Special Impact Test (Tire, Walker, Ball)

There is no standard test specifying how to measure the sound pressure levels generated by a person walking on a floor. Several years ago in ASTM committee E33, a single microphone measurement technique was proposed and was adopted for use in this laboratory. A single microphone is placed 1 m below the mid-point of the ceiling and the room below is made much less reverberant by placing sound absorbing material in it. The same microphone technique is used for measuring walker, ball and tire levels.

The Japanese measurement standard JIS 1418 specifies a heavy impactor source for evaluating floor constructions. It consists of an automobile tire mounted on an arm attached to motor. The motor lifts the tire and then utilizes cams to drop the tire freely on the floor. The cam system prevents the tire from striking the floor again until it has been lifted to the correct drop height. JIS 1418 specifies many drop positions for the tire and several microphone positions. Earlier research with this machine showed that only a few positions of the tire were necessary. The single microphone position is also considered adequate for comparison of floors tested within a single laboratory.

For the walker tests, a male member of the laboratory walks for about 3 minutes while the computer collects maximum sound levels for each 100 footsteps using a 35 ms time constant.

The ball used in these measurements was developed by H. Tachibana as part of his research. The ball is 180 mm in diameter and weighs 2.5 kg. It is dropped from a height of 900 mm. The force generated is sufficiently repeatable that only 15 impulses need be averaged.

Deck-Suspended Ceiling Hanger

Model ICC

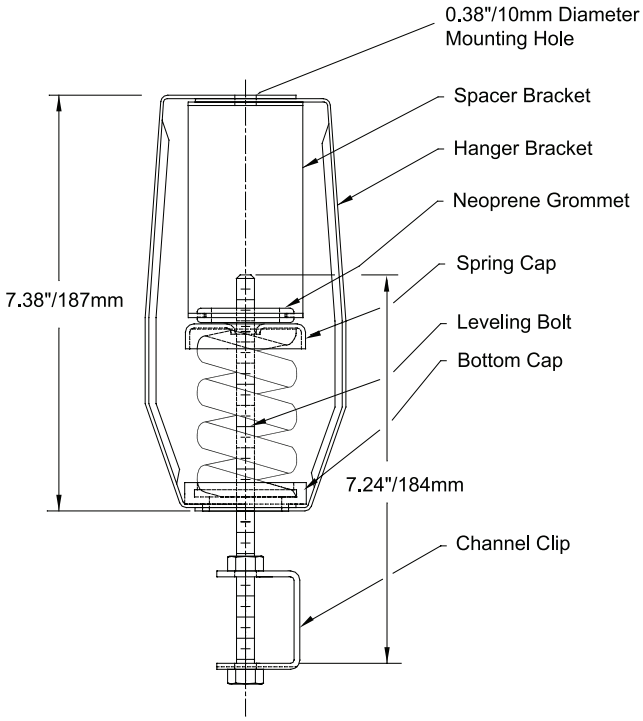
Application

Secured to concrete, metal deck, or structural framing, Model ICC incorporates a one-inch (1") rated deflection spring in series with a neoprene cup to resiliently support one or more layers of gypsum board. Attachment can be direct to concrete or metal deck, or it can be suspended from threaded rod that is properly anchored. A channel clip/leveling rod assembly is designed to carry a single piece of 1-1/2" x 1/2" 16-gage steel carrying channel. Drywall furring channel is attached to the carrying channel. The system provides the installer with a means for leveling the isolated ceiling framing. Gypsum board attaches quickly and easily thanks to a spacer bracket that holds the isolator rigid until the weight of the gypsum board compresses the spring. Incorporate Model ICC into any isolated ceiling design where one-inch (1") rated spring deflection and a ten-inch (10") airspace are needed for superior performance.

Features

- Maximum natural frequency of 4.4 Hz under lightest typical load conditions.
- STC 84, IIC 70 with two (2) layers of gypsum board suspended under a 6-inch concrete slab (75 psf) with 3-1/2" fiberglass batt in airspace.
- Multiple features incorporated into the design ensure inexpensive installation.
- Spring/neoprene cup combination improves performance against low-frequency noise.
- Actual installed load can vary between 75% and 150% of rated load without significant impact to ceiling performance.

Product Detail

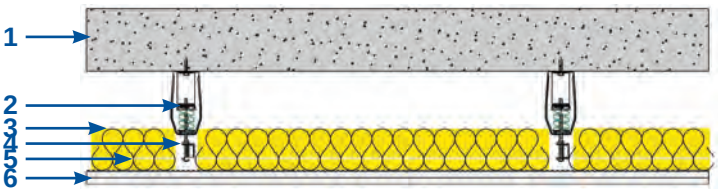


STC/IIC Sound Test Data

STC-53 IIC-27

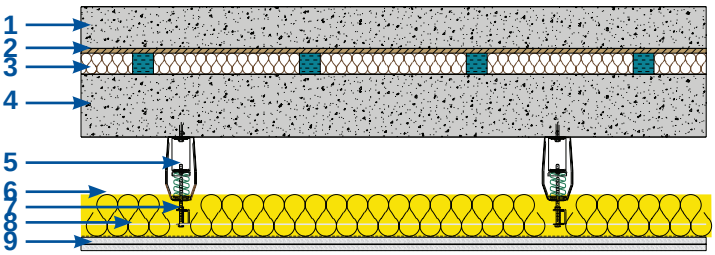
1 - 6" Concrete Slab

Polysonics proposed acoustical floor-ceiling assembly



STC-84 IIC-70

1 - 6" Concrete Slab
2 - ICC Isolation Hanger
3 - 3-1/2" Insulation
4 - CRC in Channel Clip
5 - Drywall Furring Channel
6 - 2 Layers 5/8" Gypsum Board



STC-94 IIC-82

1 - 4" Concrete Slab
2 - 1/2" Plywood
3 - 2" RIM-Q-2-16
4 - 6" Concrete Slab
5 - ICC Isolation Hanger
6 - 3-1/2" Fiberglass Insulation
7 - Cold Rolled Channel (CRC)
8 - Drywall Furring Channel
9 - 2 Layers 5/8" Gypsum Board

*Visit **www.kineticsnoise.com/arch/tests/icc.aspx** for complete Model ICC STC/IIC Sound test data*

Standard Capacities

Model	Spring Color	Spring Rate (lb/in)
ICC-24	Blue	24
ICC-37	White	37
ICC-50	Green	50
ICC-75	Black	75
ICC-100	Gray	100
ICC-150	Red	150
ICC-210	Brown	210

Also Available

Muta Spring Wire-Tie Ceiling Hanger with same spring capacities is also available from Kinetics. Contact your local sales representative for more information.

Gold Bond® BRAND SoundBreak® XP® Gypsum Board

Gold Bond® BRAND Gypsum Board

National Gypsum®

Gold Bond® BRAND SoundBreak® XP®
Gypsum Board

SoundBreak XP Gypsum Board allows for construction of higher STC area separation walls.

Market Trends Driving The Need For Higher Rated STC Wall Partitions

Increasing land costs have resulted in larger amounts of high density multi-family housing in a growing number of United States housing markets. The result of high density housing is individual living units positioned closer together than traditional single-family housing.

Home theatre systems are becoming more prevalent in use and sophistication, resulting in the potential for more noise being transmitted between wall partitions. Commercial buildings such as schools, hospitals, hotels and government/military facilities also have an increasing need to control sound between areas of a building.

All of these changing market dynamics have resulted in an increased need for higher rated Sound Transmission Class (STC) wall partitions, which reduce the transmission of airborne sound between living spaces within buildings.

Gold Bond® BRAND SoundBreak® XP® Gypsum Board

Gold Bond® BRAND SoundBreak XP Gypsum Board is an acoustically enhanced gypsum board used in the construction of high STC wall assemblies. This innovative gypsum board allows for construction of high STC wall assemblies that are thinner, cost effective and more reliable than traditional methods for constructing these types of assemblies.

Key Acoustical Terms and Concepts

Airborne Sound

Airborne sound consists of energy generated by a source, transmitted through a medium, and detected by a receiver. All three of these conditions must be in place or airborne sound cannot exist. The following chart describes what happens when a drumstick strikes a drumhead.

The level of airborne sound is determined by the intensity of the vibration. Frequencies between 20 Hz and 20,000 Hz are detectible by children. Most humans are sensitive to the range of 100 Hz to 5000 Hz. Speech and other traditional sounds within a building range from 125 Hz – 4,000 Hz, which is the frequency range considered when calculating STC.

SOUND TRANSMISSION

Energy Generated by a Source	►	Transmitted Through a Medium	►	Detected by a Receiver
Drumstick strikes drumhead, vibrating air	►	Vibrating air transmits the sound in waves of pressure changes	►	Ear receives and hears waves of pressure changes as sound

Sound Transmission Class

The Sound Transmission Class (STC) is a single number rating of the effectiveness of a material or construction assembly to retard the transmission of airborne sound. STC provides an indication of how loud transmitted sound is perceived by the listener. Higher STC values are more effective for reducing sound transmission.

STC values are derived by conducting a test according to a procedure outlined in ASTM E 90 *Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.* The test data collected would be analyzed using ASTM E 413 Classification for Rating Sound Insulation and result in a single-number acoustical rating. The rating assesses the airborne sound transmission performance at a range of frequencies from 125 Hz to 4000 Hz, which is consistent with the frequency range of speech.

What is an Acceptable STC Rating for a Wall Partition?

National Research Council of Canada Survey

- 600 multi-family residences (300 party walls between them)
- Residents with lower STC rated walls are more likely to:
  - Want to move
  - Be awakened by noises
  - Have trouble falling asleep due to noises
  - Think neighbors are less considerate

General survey conclusions

- STC ≥55 A realistic goal for acceptable sound insulation
- STC ≥60 More ideal, would practically eliminate negative effects of noises from neighbors
- Music related sounds may require the highest rated walls

J. S. Bradley, *Deriving Acceptable Values for Party Wall Sound Insulation* survey results

Decibel

Decibels (dB) are used in acoustics to provide relative measurement of sound level. Higher dB levels relate to loud sounds while lower dB levels relate to quiet sounds. A change of 3 dB would be barely noticeable to most human's ears, while a change of 5 dB would generally be noticeable to most people. An increase of 10 dB would sound twice as loud and a decrease of 10 dB would sound half as loud.

RATING	ACTIVITY	SOUND LEVEL (dB)
Painful	Jet Engine	120+
Very Loud	Industrial Machinery	100
Loud	Stock Trader Floor	80
Moderate	Normal Speech	65
Quiet	Suburban Home	45
Very Quiet	Barely Audible	25

HUMAN SENSITIVITY TO CHANGES IN SOUND INTENSITY LEVELS

1 dB	Generally not perceptible
3 dB	Just perceptible
5 dB	Clearly noticeable
10 dB	Twice or half as loud
20 dB	Four times as loud or 1/4 as loud

Design Considerations in Acoustical Wall Partitions

The goal of a high rated STC wall partition is to decrease the amount of sound transmission through the partition. The following five variables can have an impact on the ability of the partition to provide this loss.

Mass
Increasing the mass of a wall partition increases the amount of sound transmission loss. Increasing mass in a cost and space effective way can be a challenge.

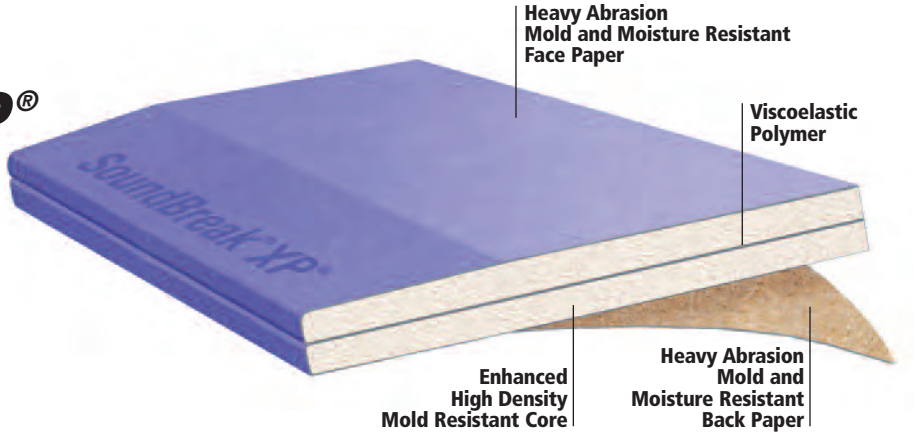
Stiffness
Increasing the stiffness of a wall partition will decrease the amount of sound transmission loss. For that reason metal studs outperform wood studs, and 24"o.c. framing spacing outperforms 16"o.c. framing spacing.

Damping
Introduction of damping will increase the amount of sound transmission loss. In particular, constrained layer damping can be effective for structure type applications.

Cavity Depth
Increasing the depth of the cavity of the partition can increase the amount of sound transmission loss, especially when the cavity is filled with acoustical insulation.

Cavity Absorption
Adding sound-absorbing material such as fiberglass or mineral fiber insulation to the cavity of a partition will increase the amount of sound transmission loss. The sound-absorbing material should completely fill the cavity but not be compacted or compressed in any way.

Gold Bond® BRAND SoundBreak® XP® Gypsum Board



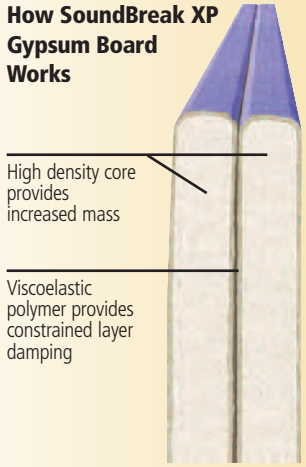
Description

Gold Bond® BRAND SoundBreak® XP® Gypsum Board has an acoustically enhanced, high density gypsum core encased in a heavy, abrasion and mold/mildew/ moisture resistant, 100% recycled, purple paper on both sides. Used in the construction of high rated STC wall assemblies, SoundBreak XP consists of a layer of viscoelastic damping polymer sandwiched between two pieces of high density mold resistant gypsum board, providing constrained layer damping.

Basic Uses

For use as single-layer application or as a component of multi-layered wall assemblies where sound transmission between rooms or dwelling units is a concern.

How SoundBreak XP Gypsum Board Works



Features/Benefits

- Resists the growth of mold per ASTM G 21 with a score of 0, the best possible score.
- Resists the growth of mold per ASTM D 3273 with a score of 10, the best possible score.
- Use of SoundBreak XP Gypsum Board results in wall partitions with high rated STC values that are thinner than traditionally built high rated STC wall partitions providing increased usable floor space.
- Superior sound damping, cost-efficient material that is easily finished and decorated in the same manner as standard gypsum board.
- All SoundBreak XP Gypsum Board designs were tested by an independent third-party acoustical laboratory using the full-scale ASTM E90 test procedure.
- SoundBreak XP Gypsum Board is installed like traditional gypsum board, offering a more reliable and less complicated solution than alternative methods requiring clips and/or channels.
- SoundBreak XP Gypsum Board can be cut by scoring deeply from both sides of the board before snapping, or with the use of a hand or power saw.
- Heavy abrasion resistant paper and denser core provide greater resistance to surface abuse and indentation when tested in accordance with ASTM C 1629.
- Features a smooth, heavy face paper that is highly resistant to scuffing and provides a superior surface for decoration.
- 5/8" SoundBreak XP features a fire resistant Type X core and is UL Classified and approved for inclusion in specific UL fire-rated designs.
- SoundBreak XP Gypsum Board is GREENGUARD Children & Schools℠ Certified for indoor air quality.
- Approved for use on walls and ceilings.

Limitations

- Exposure to excessive or continuous moisture and extreme temperatures should be avoided. SoundBreak XP Gypsum Board is not recommended where it will be exposed to temperatures exceeding 125°F (52°C) for extended periods of time.
- Installing SoundBreak XP Gypsum Board panels over an insulating blanket, installed continuously across the face of the framing members, is not recommended. Blankets should be recessed and flanges attached to the sides of the studs.
- SoundBreak XP Gypsum Board must be stored off the ground and under cover. Sufficient risers must be used to ensure support for the entire length of the gypsum board to prevent sagging.
- SoundBreak XP Gypsum Board must be kept dry to minimize the potential for mold growth. Adequate care should be taken while transporting, storing, applying and maintaining SoundBreak XP Gypsum Board. For additional information, refer to the Gypsum Association publication, *"Guidelines for the Prevention of Mold Growth on Gypsum Board"* (GA-238-03), which is available at **gypsum.org** under the "Download Free Gypsum Association Publications" section.

Accessories

(See Installation Recommendations)

- Fasteners: Drywall Screws or Nails
- Joint Tape
- Joint Compound
- Cornerbead
- Trims
- Casing Beads
- Acoustical Sealant
- Acoustical Putty Pads

Installation

Applicable Standards and References

ASTM C 840

Gypsum Association GA-216

Gypsum Association GA-214

National Gypsum
Gypsum Construction Guide

Recommendations

Installation of SoundBreak XP Gypsum Board should be consistent with methods described in the standards and references noted.

Gold Bond® BRAND SoundBreak® XP® Gypsum Board

GUIDELINES FOR OPTIMUM PERFORMANCE AND SOUND REDUCTION

- Stagger SoundBreak XP Gypsum Board joints from one side of the wall to the other.
- Allow a 1/4" gap along all wall perimeter edges and completely seal 1/4" gap with acoustical sealant or caulk.
- Refrain from wall penetrations when possible.
- Limit necessary wall penetrations to one per stud cavity.
- Seal all penetrations with acoustical sealant and/or putty pads.
- The use of SoundBreak XP Gypsum Board in actual installations may not produce the same results as were achieved in controlled, laboratory conditions.

Cutting SoundBreak XP Gypsum Board

- SoundBreak XP Gypsum Board can be cut by scoring deeply from both sides of the board before snapping, or with the use of a hand or electric saw. Cutting across the 4' width may require use of a saw.

Acoustical Sealants and Putty Pads

- Use an acoustical sealant that is applied per ASTM C919, such as Grabber Acoustical Sealant GSCSF, STI SpecSeal Smoke N Sound Caulk, BOSS 824 Acoustical Sound Sealant or equivalent.
- Use a putty pad that has been tested per ASTM E90, such as STI SpecSeal SSP Putty Pads or BOSS 818 Fire-Rated Putty Pads or equivalent.

Decoration

For best painting results, all surfaces, including joint compound, should be clean, dust-free and not glossy. To improve fastener and joint concealment, a coat of a quality drywall primer is recommended to equalize the porosities between surface paper and joint compound.

The selection of a paint to give the specified or desired finished characteristics is the responsibility of the architect or contractor.

SoundBreak XP Gypsum Board that is to have a wall covering applied should be prepared and primed as described for painting.

Gypsum Association GA-214, *Recommended Specification for Levels of Gypsum Board Finish,* should be referred to in order to determine the level of finishing required to ensure a properly prepared surface that accepts the desired decoration.

Technical Data

Fire Resistance Ratings

Fire resistance ratings represent the results of tests on assemblies in a specific configuration. When selecting construction designs to meet certain fire resistance requirements, caution must be used to ensure that each component of the assembly is the one specified in the test. Further precautions should be taken that assembly procedures are in accordance with those of the tested assembly. For copies of specific tests, call 1-800-NATIONAL. For fire safety information, go to **nationalgypsum.com.**

5/8" SoundBreak XP can be used as a substitute for Type X gypsum board in some proprietary fire-rated assemblies.

As an option, 1/2" SoundBreak XP may be used as an additional layer on one or both sides of fire-rated wall assemblies. 1/2" SoundBreak XP cannot be used as a substitute for 5/8" Type X gypsum board in a fire-rated assembly.

SoundBreak XP shall be attached in accordance with manufacturer's recommendations. When SoundBreak XP is installed between the framing and the UL Classified gypsum board, the UL Classified gypsum board layer(s) required for the design is/are to be installed as indicated in the design as to fastener type and spacing, except that the required fastener length shall be increased by a minimum of 5/8".

Mold and Mildew Resistance*

SoundBreak XP Gypsum Board was designed to provide extra protection against mold and mildew compared to standard gypsum board products. When tested by an independent laboratory, SoundBreak XP received the highest possible ratings on ASTM G 21 and ASTM D 3273.

The use of SoundBreak XP in actual installations may not produce the same results as were achieved in controlled laboratory conditions.

*No material can be considered "mold-proof," nor is it certain that any material will resist mold or mildew indefinitely. When used in conjunction with good design, handling, and construction practices, SoundBreak XP Gypsum Board can provide increased mold resistance versus standard gypsum board products. As with any building material, avoiding water exposure during handling, storage and installation, and after installation is complete, is the best way to avoid the formation of mold or mildew.

PHYSICAL PROPERTIES

Thickness, nominal	**1/2" Regular** (12.7 mm)	**5/8" Type X** (15.9 mm)
Width, nominal	4' (1219 mm)	4' (1219 mm)
Length, standard	8' through 12' (2438 mm – 3657 mm)	8' through 12' (2438 mm – 3657 mm)
Weight, lbs./sq. ft., nominal	2.3	2.7
Edges	Tapered	Tapered
Surface Burning Characteristics (per ASTM E 84)	Flame spread: 15 Smoke developed: 0	Flame spread: 15 Smoke developed: 0
Surface Abrasion Resistance (per ASTM C 1629)	Level 3	Level 3
Indentation Resistance (per ASTM C 1629)	Level 1	Level 1
Soft Body Impact Resistance (per ASTM C 1629)	Level 1	Level 2
Hard Body Impact Resistance (per ASTM C 1629)	N/A	Level 1

APPLICABLE STANDARDS AND REFERENCES

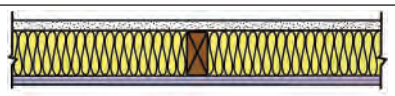
ASTM C 1396
ASTM C 1629
ASTM C 840
ASTM D 3273
ASTM G 21
Gypsum Association GA-216
Gypsum Association GA-214

SoundBreak® XP® Gypsum Board Acoustical Selector Guide

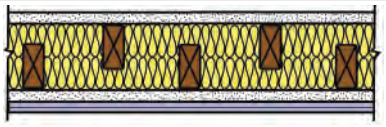
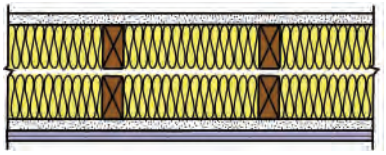
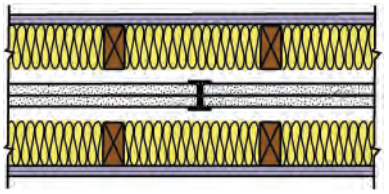
1/2" REGULAR GYPSUM BOARD PARTITIONS – WOOD FRAMING

	Description	Test No.	STC
SINGLE LAYER – 2X4 STUDS			
	1/2" Regular Gypsum Board vertically applied to each side of 2x4 studs 16" o.c. with 1-1/4" type W screws 12"o.c. Joints staggered on opposite side. 3" glass fiber insulation in stud cavity.	NBC-W1b	**34**

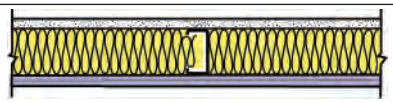
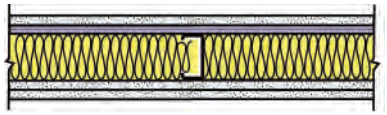
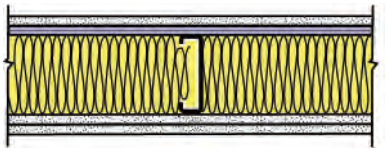
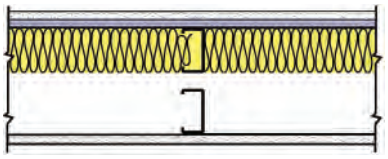
1/2" SOUNDBREAK® XP® GYPSUM BOARD PARTITIONS – WOOD FRAMING

	Description	Test No.	STC
SINGLE LAYER – 2X4 STUDS			
	1/2" SoundBreak XP Gypsum Board vertically applied to one side of 2x4 studs 24" o.c. with 1-1/4" type W screws 12"o.c. 1/2" Gold Bond Gypsum Board vertically applied to opposite side with 1-1/4" type W screws 12"o.c. Joints staggered on opposite side. 3" glass fiber insulation in stud cavity.	NGC 2009027	**49**
UNBALANCED – 2X4 STUDS			
	Base layer of 1/2" Gold Bond Gypsum Board vertically applied to one side of 2x4 studs 24" o.c. with 1-1/4" type W screws 24"o.c. Face layer of 1/2" SoundBreak XP Gypsum Board vertically applied with 1-5/8" type W screws 12"o.c. 1/2" Gold Bond Gypsum Board vertically to opposite side with 1-1/4" type W screws 12"o.c. Joints staggered each layer and opposite sides. 3" glass fiber insulation in stud cavity.	NGC 2009028	**51**

5/8" SOUNDBREAK® XP® GYPSUM BOARD PARTITIONS – WOOD FRAMING

Fire Rating	Ref.	Design No.	Description	Test No.	STC
SINGLE LAYER – 2X4 STUDS					
1 hr. 	UL	U309	5/8" SoundBreak XP Gypsum Board vertically applied to each side of 2x4 studs spaced 24" o.c. with 1-1/4" type W screws 12" o.c. 3-1/2" glass fiber in stud cavity.	RAL TL-07-145	**53**
UNBALANCED STAGGERED – 2X4 STUDS					
1 hr. 	GA	Based on WP3514	Base layer 5/8" Fire-Shield Gypsum Board vertically applied to staggered 2x4 studs spaced 16" o.c. on 2x6 plates with 1-1/4" type W screws 12" o.c. Face layer of 5/8" SoundBreak XP vertically applied with 2" type W screws 16" o.c. 5/8" Fire-Shield Gypsum Board vertically applied to opposite side with 1-1/4" type W screws 12" o.c. Vertical joints staggered 16" each layer and opposite sides. 2-1/2" glass fiber in stud cavity.	RAL TL-07-170	**60**
UNBALANCED DOUBLE ROW – 2X4 STUDS					
1 hr. 	GA	Based on WP3514	Base layer 5/8" Fire-Shield Gypsum Board vertically applied to double row of 2x4 studs spaced 16" o.c. on separate plates with 1-1/4" type W screws 12" o.c. Face layer of 5/8" SoundBreak XP vertically applied with 2" type W screws 16" o.c. 5/8" Fire-Shield Gypsum Board vertically applied to opposite side with 1-1/4" type W screws 12" o.c. Vertical joints staggered 16" each layer and opposite sides. 3-1/2" glass fiber in stud cavity.	RAL TL-07-147	**64**
H-STUD AREA SEPARATION WALL					
2 hr. 	UL	U347	Two layers of 1" Fire-Shield Shaftliner inserted in 2"H-studs spaced 24" o.c. Minimum 3/4" air space between shaftliner and adjacent construction. 5/8" SoundBreak XP Gypsum Board vertically applied to outside of 2x4 studs spaced 16" o.c. with 1-1/4" type W screws 12" o.c. 3-1/2" glass fiber in stud cavity.	NRCC B-3451.1	**67**

5/8" SOUNDBREAK® XP® GYPSUM BOARD PARTITIONS – STEEL FRAMING

Fire Rating		Ref.	Design No.	Description	Test No.	STC
SINGLE LAYER – 3-5/8" STUDS						
1 hr.		UL	U465	5/8" SoundBreak XP Gypsum Board vertically applied to one side of 3-5/8" steel studs 24" o.c. with 1" type S screws 8" o.c. at perimeter and 12" o.c. in the field. 5/8" Fire-Shield Gypsum Board vertically applied to opposite side with 1" type S screws 8" o.c. at perimeter and 12" o.c. in the field. Joints staggered on opposite side. 3-1/2" glass fiber in stud cavity.	RAL TL-07-389	**54**
UNBALANCED – 3-5/8" STUDS						
1 hr.		UL	U465	Base layer 5/8" SoundBreak XP Gypsum Board vertically applied to 3-5/8" steel studs spaced 24" o.c. with 1" type S screws 24" o.c. Face layer 5/8" Fire-Shield Gypsum Board vertically applied with 1-5/8" type S screws 12" o.c. 5/8" Fire-Shield Gypsum Board vertically applied to opposite side with 1" type S screws 12" o.c. Vertical joints staggered 24" each layer and opposite sides. 3-1/2" glass fiber in stud cavity.	RAL TL-06-334	**57**
DOUBLE LAYER – 3-5/8" STUDS						
2 hr.		UL	V484	Base layer 5/8" SoundBreak XP Gypsum Board vertically applied to 3-5/8" steel studs spaced 24" o.c. with 1" type S screws 24" o.c. Face layer 5/8" Fire-Shield Gypsum Board vertically applied with 1-5/8" type S screws 12" o.c. Two layers 5/8" Fire-Shield Gypsum Board vertically applied to opposite side. Base layer attached with 1" type S screws 24" o.c. Face layer attached with 1-5/8" type S screws 12" o.c.Vertical joints staggered 24" each layer and opposite sides. 3-1/2" glass fiber in stud cavity.	RAL TL-07-168	**60**
DOUBLE LAYER – 6" STUDS						
2 hr.		UL	V484	Base layer 5/8" SoundBreak XP Gypsum Board vertically applied to 6" steel studs spaced 24" o.c. with 1" type S screws 24" o.c. Face layer 5/8" Fire-Shield Gypsum Board vertically applied with 1-5/8" type S screws 12" o.c. Two layers 5/8" Fire- Shield Gypsum Board vertically applied to opposite side. Base layer attached with 1" type S screws 24" o.c. Face layer attached with 1-5/8" type S screws 12" o.c. Vertical joints staggered 24" each layer and opposite sides. 6" glass fiber in stud cavity.	NRCC B-3456.2	**61**
UNBALANCED DOUBLE ROW – 2-1/2" STUDS						
1 hr.		UL	V488	Base layer 5/8" SoundBreak XP Gypsum Board applied vertically to double row of 2-1/2" steel studs 24" o.c. with 1" type S screws 8"o.c. at perimeter and 12"o.c. in the field. Face layer 5/8" Fire-Shield Gypsum Board applied vertically to opposite side with1" type S screws 8"o.c. at perimeter and 12"o.c. in the field. Joints staggered on opposite side. 3" glass fiber or mineral wool insulation in stud cavity.	NGC 2008036	**59**

Note: In multi-layer systems, SoundBreak XP Gypsum Board can be used as either a face layer or a base layer without affecting the STC rating.

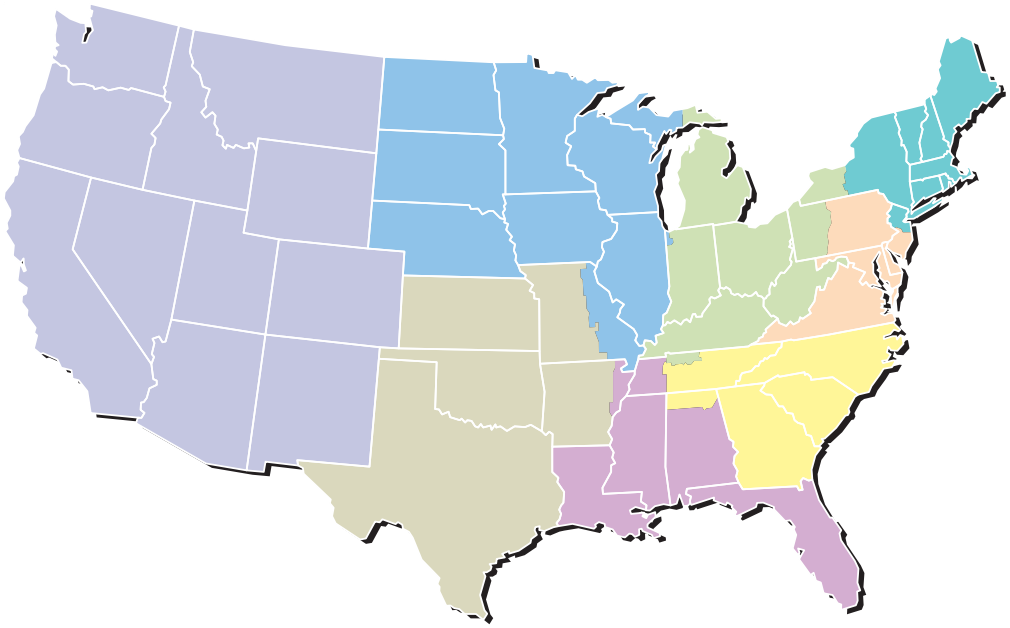
UL Listed Assemblies

The 5/8" SoundBreak XP Gypsum Board is tested in accordance with ASTM Standard E 119 and is classified as Type X for use in the following UL listings:
U017, U301, U302, U305, U309, U326, U330, U332, U338, U339, U341, U342, U351, U354, U355, U356, U357, U358, U360, U364, U368, U369, U371, U379, U392, U405, U411, U418, U420, U425, U428, U429, U434, U439, U449, U450, U460, U465, U466, U475, U487, U494, U499, U505, U524, U525, U531, U646, U647, U648, U649, U651, U652, U926, V408, V415, V419, V420, V421, V425, V430, V432, V433, V434, V435, V438, V449, V450, V486, V483, V484, V488

UL Core Designation

5/8" SoundBreak XP Gypsum Board: SoundBreak XP

CUSTOMER SERVICE SALES AREAS



Atlantic Area
Phone: (800) 237-9167
Fax: (877) 252-0430

Central Area
Phone: (800) 252-1065
Fax: (866) 232-0440

Gulf Area
Phone: (800) 343-4893
Fax: (866) 482-8940

Midwest Area
Phone: (800) 323-1447
Fax: (866) 692-8590

Northeast Area
Phone: (800) 253-3161
Fax: (866) 632-1480

Southeast Area
Phone: (800) 548-9394
Fax: (866) 732-1990

Southwest Area
Phone: (800) 548-9396
Fax: (866) 792-7520

Western Area
Phone: (800) 824-4227
Fax: (800) 438-6266

National Accounts
Phone: (800) 440-1230
Fax: (866) 622-3590

Manufactured Housing
Phone: (800) 455-3185
Fax: (800) 639-1714

Gold Bond® BRAND SoundBreak® XP® Gypsum Board

soundbreakxp.info

LIMITED WARRANTY AND REMEDIES

Products manufactured and sold by National Gypsum are warranted by National Gypsum to its customers to be free from defects in materials and workmanship at the time of shipment. THIS EXPRESS WARRANTY IS THE ONLY WARRANTY APPLICABLE TO SUCH PRODUCTS, AND IS IN LIEU OF AND EXCLUDES ALL OTHER EXPRESS ORAL OR WRITTEN WARRANTIES AND ALL IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

National Gypsum will not be liable for any incidental, indirect or consequential losses, damages or expenses. The customer's exclusive remedy for any type of claim or action for defective products will be limited to the replacement of the products (in the form originally shipped) or, at National Gypsum's option, to a payment or credit not greater than the original purchase price of the products.

National Gypsum will not be liable for products claimed to be defective where the defect resulted from causes not within National Gypsum's control, or which arose or occurred after shipment, including but not limited to accidents, misuse, mishandling, improper installation, contamination or adulteration by other materials or goods, or abnormal conditions of temperature, moisture, dirt or corrosive matter.

Any claim that products sold by National Gypsum were defective or otherwise did not conform to the contract of sale is waived unless the customer submits it in writing to National Gypsum within thirty (30) days from the date the customer discovered or should have discovered the defect or nonconformance. No legal action or proceeding complaining of goods sold by National Gypsum may be brought by the customer more than one year after the date the customer discovered or should have discovered the defect or problem of which it complains.

Children & Schools GREENGUARD® Indoor Air Quality Certified

Corporate Headquarters

National Gypsum Company
2001 Rexford Road
Charlotte, NC 28211

Phone: (704) 365-7300
Web: nationalgypsum.com
nationalgypsum.com/espanol

Technical Information

Phone: (800) NATIONAL
(800) 628-4662
Fax: (800) FAX-NGC1
(800) 329-6421

National Gypsum®

ITEM	SPECIFICATION	PROPERTY
CELL STRUCTURE		CROSSLINKED EXPANDED POLYETHYLENE
DENSITY (LB/FT^3)	ASTM D3575-93	2.0 - 2.4
CELL SIZE (MM AVERAGE)	ASTM D3576 MODIFIED	.9
COMPRESSIVE STRENGTH VERTICAL DIRECTION (PSI)	ASTM D3575-93 SUFFIX D @ 25% @ 50%	 10.5 19.5
COMPRESSIVE SET (% ORIGINAL THICKNESS)	ASTM D3575-93 SUFFIX B	15%
COMPRESSIVE CREEP (% DEFLECTION)	ASTM D3575-93 SUFFIX BB (1000 HRS.)	<5% @ 2.0 PSI
TENSILE STRENGTH (PSI) (@ 1/2" THICKNESS)	ASTM D3575-93 SUFFIX T MD / CMD	42 PSI
TEAR RESISTANCE (LB/IN) (@ 1/2" THICKNESS)	ASTM D3575-93 SUFFIX G MD / CMD	13
WATER ABSORPTION (LB/FT^3)	ASTM D3575-93 SUFFIX L	<0.2
THERMAL RESISTANCE R-VALUE ($HR-FT^2-{}^0F/BTU$)	ASTM C518-91	2.09 - 2.48
THERMAL CONDUCTIVITY k-VALUE ($BTU-IN/HR-FT^2-{}^0F$)	ASTM C518-91	0.40 - 0.48
THERMAL STABILITY (% SHRINKAGE)	ASTM D3575-93 SUFFIX S	<5%

* STRONG, TOUGH AND LIGHTWEIGHT
* NOT WATER ABSORBANT
* CHEMICAL, SOLVENT AND WEATHER RESISTANT

DIMENSION FORMAT: IN (mm)

KINETICS Noise Control

TITLE: ENGINEERING PROPERTIES FOR TYPE PIB/SRP PERIMETER ISOLATION

LAST DATE REVISED: 5/5/09

DRAWN BY: MDV

DRAWING NO. AA: AA001908

KINETICS Noise Control

Address: 6300 Irelan Place, Dublin, Ohio 43017
Phone: 800.959.1229
Fax: 614.889.0540
Web: www.KineticsNoise.com
Email: ArchSales@KineticsNoise.com

LEED Analysis
Model PIB/SRP

Recycled Content

The Kinetics Model PIB/SRP does not contain significant recycled content.

Fabrication Location

The Kinetics Model PIB/SRP is manufactured in Dublin, OH 43017.

Material Source

The extraction points for the materials in the Kinetics Model PIB/SRP can not be verified. Assume they are outside of the 500 mile radius.

PERFORMANCE CRITERIA [MATERIAL AND CURING CONDITIONS @ 73°F (23°C) AND 50% R.H.]	
TENSILE PROPERTIES (ASTM D-412) AT 21 DAYS:	
TENSILE STRESS	175 psi min. (1.21 MPa)
ELONGATION AT BREAK	550%
MODULUS OF ELASTICITY	25% 35 psi (0.24 MPa) 50% 60 psi (0.41 MPa) 100% 85 psi (0.59 MPa)
SHORE A HARDNESS (ASTM D-2240) AT 21 DAYS	40 ± 5
TEAR STRENGTH (ASTM D-624) AT 21 DAYS	55 lbs./inch
ADHESION IN PEEL (TT-S-00230C, ASTM C 794)	CONCRETE 20 lb. - 0% ADHESION LOSS
SERVICE RANGE	-40° TO 170° F (-40° TO 77° C)
INITIAL CURE / FINAL CURE	TACK FREE 3 -6 HOURS / 4 - 7 DAYS
COVERAGE (20 oz. UNI-PAC SAUSAGE)	24 LINEAR FEET (7.3M) x 1/2" (12) x 1/4" (6) JOINT
SHELF LIFE (20 oz. UNI-PAC SAUSAGE)	12 MONTHS

MEETS FEDERAL SPECIFICATION TT-S-0023OC, TYPE II, CLASS A.
MEETS ASTM C-920, TYPE S, GRADE NS, CLASS 35, USE T, NT, O, M, G, I.

* A SUPERIOR CUSHIONING MATERIAL
* SMOOTH, SOFT, AND ATTRACTIVE
* PAINTABLE WITH WATER, OIL AND RUBBER BASED PAINTS
* STRONG, TOUGH, AND LIGHT WEIGHT
* NON WATER - ABSORBANT
* CHEMICAL, SOLVENT, AND WEATHER RESISTANT

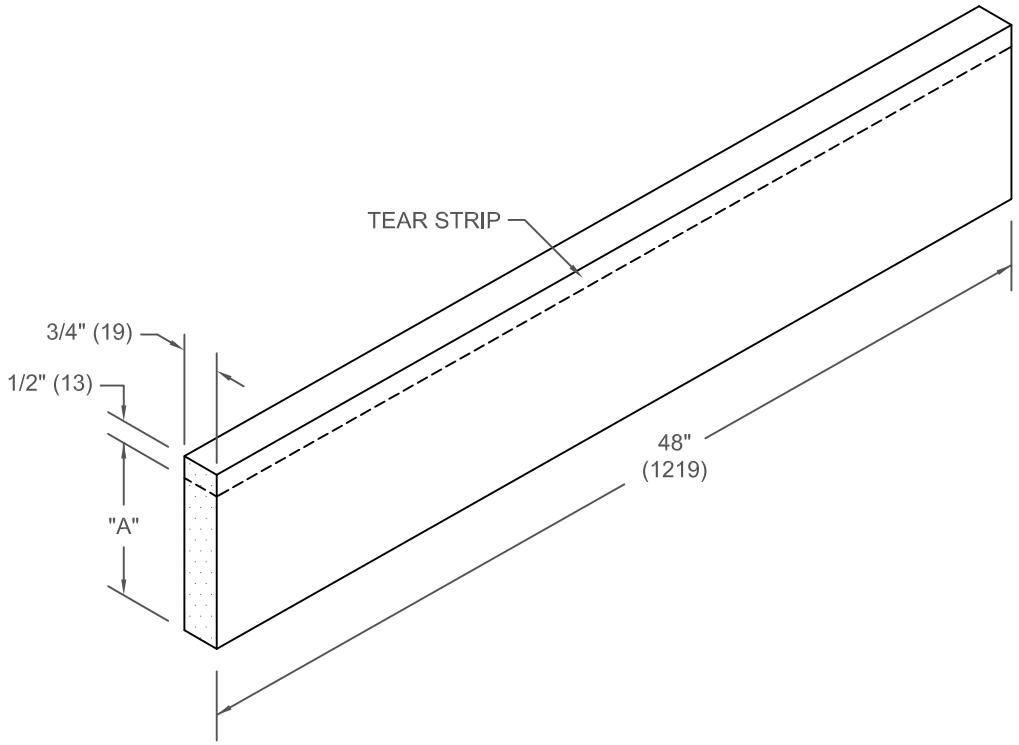
DIMENSION FORMAT: IN (mm)

KINETICS Noise Control

TITLE	LAST DATE REVISED	REVISED BY	DRAWING NO.
ENGINEERING PROPERTIES FOR PERIMETER SEALANT	10/27/11	MDV	S-11.22-1A

S-11

DIMENSION "A"	
(in)	(mm)
4.00	102
6.00	152
8.00	203
10.00	254
12.00	305



PIB PERIMETER ISOLATION BOARD		
PROPERTY	VALUE	SPECIFICATION
COLOR	WHITE	
CELL STRUCTURE	CLOSED CELL, CROSSLINKED EXPANDED POLYETHYLENE	
DENSITY RANGE (LB/FT)	2.0 - 2.4	ASTM D3575-93
CELL SIZE (MM AVERAGE)	0.9	ASTM D3576 MODIFIED
COMPRESSIVE STRENGTH VERTICAL DIRECTION (PSI)	10.5 19.5	ASTM D3575-93 SUFFIX D @ 25% @ 50%
COMPRESSIVE SET (% ORIGINAL THICKNESS)	15%	ASTM D3575-93 SUFFIX B
COMPRESSIVE CREEP (% DEFLECTION)	<5% @ 2.0 PSI	ASTM D3575-93 SUFFIX BB (1000 HRS.)
TENSILE STRENGTH (PSI) (@ 1/2" THICKNESS)	42 35	ASTM D3575-93 SUFFIX T MD / CMD
TEAR RESISTANCE (LB/IN) (@ 1/2" THICKNESS)	13 11	ASTM D3575-93 SUFFIX G MD / CMD
WATER ABSORPTION (LB/FT)	<0.2	ASTM D3575-93 SUFFIX L
THERMAL RESISTANCE R-VALUE (HR-FT - F/BTU)	2.09 - 2.48	ASTM C518-91
THERMAL CONDUCTIVITY k-VALUE (BTU-IN/HR-FT - F)	0.40 - 0.48	ASTM C518-91
THERMAL STABILITY (% SHRINKAGE)	<5%	ASTM D3575-93 SUFFIX S

KINETICS Noise Control

Member VISCMA Vibration Isolation and Seismic Control Manufacturers Association

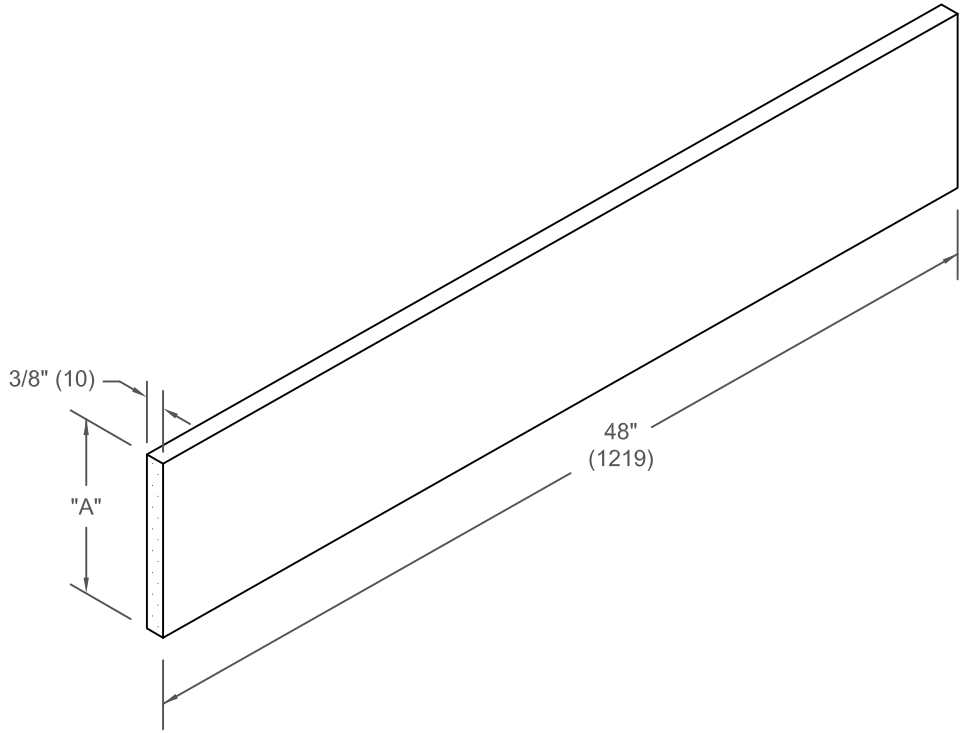
KINETICS NOISE CONTROL, INC
6300 IRELAN PL,
DUBLIN, OH 43017 USA
Ph: 614 889-0480, Fax: 614 889-0540
www.kineticsnoise.com

Model: PIB

By: BB
Date: 03/28/08
Revised: 05/15/12 / BB

Drawing No: S-11.21-1D

DIMENSION "A"	
(in)	(mm)
1.00	25
2.00	51
3.00	76
4.00	102
5.00	127



SRP PERIMETER ISOLATION BOARD		
PROPERTY	VALUE	SPECIFICATION
COLOR	WHITE	
CELL STRUCTURE	CLOSED CELL, CROSSLINKED EXPANDED POLYETHYLENE	
DENSITY RANGE (LB/FT)	2.0 - 2.4	ASTM D3575-93
CELL SIZE (MM AVERAGE)	0.9	ASTM D3576 MODIFIED
COMPRESSIVE STRENGTH VERTICAL DIRECTION (PSI)	10.5 19.5	ASTM D3575-93 SUFFIX D @ 25% @ 50%
COMPRESSIVE SET (% ORIGINAL THICKNESS)	15%	ASTM D3575-93 SUFFIX B
COMPRESSIVE CREEP (% DEFLECTION)	<5% @ 2.0 PSI	ASTM D3575-93 SUFFIX BB (1000 HRS.)
TENSILE STRENGTH (PSI) (@ 1/2" THICKNESS)	42 35	ASTM D3575-93 SUFFIX T MD / CMD
TEAR RESISTANCE (LB/IN) (@ 1/2" THICKNESS)	13 11	ASTM D3575-93 SUFFIX G MD / CMD
WATER ABSORPTION (LB/FT)	<0.2	ASTM D3575-93 SUFFIX L
THERMAL RESISTANCE R-VALUE (HR-FT - F/BTU)	2.09 - 2.48	ASTM C518-91
THERMAL CONDUCTIVITY k-VALUE (BTU-IN/HR-FT - F)	0.40 - 0.48	ASTM C518-91
THERMAL STABILITY (% SHRINKAGE)	<5%	ASTM D3575-93 SUFFIX S

KINETICS Noise Control

Member VISCMA
Vibration Isolation and Seismic Control Manufacturers Association

KINETICS NOISE CONTROL, INC
6300 IRELAN PL,
DUBLIN, OH 43017 USA
Ph: 614 889-0480, Fax: 614 889-0540
www.kineticsnoise.com

Model: SRP

By: BB
Date: 03/28/08
Revised: 05/15/12 / BB

Drawing No: S-11.21-1E

POLYSONICS

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