

# SIEBEIN ASSOCIATES, INC.

## Consultants in Architectural and Environmental Acoustics

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July 25, 2012

Ms. Lucy Dixon, Association Manager  
Vizcaya of Bradenton Condominium Association, Inc.  
6101 34<sup>th</sup> Street West, Building 34  
Bradenton, Florida 34210

Dear Lucy,

This letter contains the results of Apparent Impact Insulation Class measurements made at the Vizcaya of Bradenton Condominiums, in Bradenton, Florida, and acoustical recommendations for hard surface floor/ceiling assemblies in lieu of carpet in upper level rooms. The recommendations are based on acoustical measurements made on site on June 19, 2012, telephone conversations with representatives of the Vizcaya of Bradenton Condominium Association and acoustical analysis conducted in our office.

### **BACKGROUND**

The current requirement for flooring surfaces in the main living areas of the condominium units is that the floor must be carpeted. Unit owners have expressed a desire to replace the carpeted floors with hard surface flooring. There were concerns that this will negatively affect lower floor unit owners due to an increase in the transmission of footfall and other impact noise.

Siebein Associates, Inc., was retained to conduct AIIC measurements of three different flooring surfaces in Unit 27H - tile, carpet, and linoleum, and to provide recommendations regarding the use of hard surface flooring in upper floor units based on the results of the measurements. It is our understanding that Mapegard 2 was used as the "resilient" underlayment below the hard surface flooring in Unit 27H. This product is 0.04" thick (40 mils).

### **APPARENT IMPACT INSULATION CLASS (AIIC) MEASUREMENT RESULTS**

The AIIC rating is used to evaluate the effectiveness of a floor/ceiling assembly in reducing the transmission of impact generated sounds such as footsteps and furniture moving to rooms below. The greater the value of the AIIC rating, the greater impact insulation of the floor/ceiling assembly. The methods and procedures used to measure the AIIC rating at Vizcaya of Bradenton were done in general conformance with ASTM Standard E1007-11, *Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures*, and ASTM Standard E989-06, *Standard Classification for Determination of Impact Insulation Class (IIC)*. This generally consists of installing a calibrated tapping machine in four locations in the approximate center of the source room, and measuring the impact sound pressure levels in the receiving room. Reverberation time measurements are also made in the receiving room to determine the amount of

sound absorption occurring in the receiving room. These values are normalized to the absorption values in a typical acoustical laboratory per the requirements of the Standard. The results are plotted against an IIC rating curve to determine the single number AIIIC rating. The results of the AIIIC tests are summarized in Table 1.

**Table 1. Floor/ceiling assembly and AIIIC ratings.**

Source Room	Floor Surface	Receiving Room	AIIIC <sup>1</sup> Rating
Unit 27 H Bathroom	Tile	Unit 27 F Bathroom	45 <sup>2</sup>
Unit 27 H Living Room	Carpet	Unit 27 F Living Room	69
Unit 27 H Kitchen	Linoleum	Unit 27 F Kitchen	45 <sup>2</sup>

<sup>1</sup>AIIIC values are adjusted to correct the sound absorption in the receiving room to that of a standard laboratory test chamber with 108 sabins of absorption. These values are typically lower than laboratory IIC test results of the same assembly, as they include the effect of flanking sound through the structure not present in laboratories.

<sup>2</sup>Volume of the room was less than 40 cu. meters, and therefore does not conform to the minimum volume requirements of ASTM Standard E1007-11. Also, the area of the room was too small to allow for the required minimum distance between microphone positions. Data should be used with caution.

## INTERPRETATION OF RESULTS

Although the difference in AIIIC rating between the carpeted floor and the hard surface floors is 24, which is very significant, the actual difference in transmitted impact sound level at the mid and high frequencies where people most perceive sounds such as footfalls and chairs dragging is between 30 and 40 dB. The nature of the AIIIC rating procedure is such that the poor low frequency performance of the wood frame structural system in the condominium units limits the AIIIC rating of the carpeted floor, which, on a stiffer floor/ceiling assembly would likely achieve AIIIC ratings in the mid 70s. The relative lack of stiffness in the floor structure is why low frequency thumps and thuds from people walking are audible at times even on the carpeted floor. For reference, a sound that is 30 to 40 dB greater than a similar sound is generally perceived as 6 to 7 times louder by people with normal hearing sensitivities.

The AIIIC 45 rating of the floor/ceiling assemblies in the bathroom and kitchen just meets the Florida Building Code minimum of IIC 45 when measured in the field. Although the results are from rooms with volumes that do not meet the 40 m<sup>3</sup> minimum room volume requirement of ASTM Standard E1007-11, the data still provide useful information for comparative purposes, but are not necessarily representative of what would occur in larger rooms. It is anticipated, based on acoustical measurements made on similar assemblies in the past, that the results in rooms with larger volumes, such as a bedroom or living room, would likely be in the be AIIIC 40 to 45 range using the same assembly that was used in Unit 27H.

## RECOMMENDATIONS

1. **The current condition of carpeted floors on thin concrete slab with a resiliently suspended ceiling used at Vizcaya of Bradenton resulted in an AIIIC value of 69 when tested in Unit 27H, which is a typical result for carpeted floors.** This is an exceptionally high value, and generally will result in few complaints by occupants relative to footfall noise. Footfall noise may

not even be audible to occupants with the exception of low frequency thumps and thuds that are transmitted by the wood frame structure.

2. **We do not recommend installing hard surface flooring in main living spaces (Living Room, Dining Room, and Bedrooms) in upper floor Units in lieu of carpet. *At minimum, carpet should be required in all Bedroom spaces, as these are the most acoustically sensitive spaces in the Units.*** Even with a higher performing resilient underlayment than that used in Unit 27H, of which there are several, the highest estimated AIIC rating with hard surface flooring would be an AIIC in the low 50s. ***We do not recommend AIIC ratings less than 59 for these Units.*** At an AIIC 50, footfalls, chairs dragging, and other impact sounds would still be plainly audible in the units below. When juxtaposed against their previous experience of a virtual absence of footfall noise, this type of change is more likely to generate complaints among residents than would occur in a new building where there was no previous experience or frame of reference involving the use of carpet.
3. **If hard surface flooring is to be allowed in the main living spaces, a much thicker and better performing underlayment than that which was used in Unit 27H should be required.** The only product we recommend, which has tested results indicating higher IIC ratings for a given thickness compared to other products on the same assemblies, is Pliteq GenieMat RST12. This product is 12mm (approximately ½") thick, which does not include the thickness of any additional substrate, mortar, or hard surface flooring. An AIIC 52 to 53 rating is likely to be achieved using GenieMat RST12 under hard surface floors at Vizcaya of Bradenton Condominiums based on an analysis of the field tests of the Mapegard 2 product used in Unit 27H and a comparison with laboratory tests on Mapegard 2 and Pliteq GenieMat RST12 installed on thicker slabs without ceilings. This exceeds the code minimum of IIC 45 measured in the field, however, it will still allow approximately 20 dB more of impact sound to pass through the structure than carpet, and is less than the HUD recommended value of IIC 55 for similar vertical adjacencies in multi-family buildings. In other words, a better IIC rating is required in government subsidized housing than would be achieved by this assembly.
4. **If hard surface flooring is to be considered for the primary living spaces in the Units, we recommend installing hard surface flooring in a model unit with the recommended underlayment and conducting a field AIIC test to determine if the anticipated performance can even be achieved before allowing it throughout the entire development.** Since this particular system has not been tested before, the risk of potentially poorer than anticipated performance is too great to take without undertaking the field tests due to the litigious nature of this issue in Florida condominiums at this time.
5. **A reduced alternative to the Pliteq GenieMat RST12 product, if a thinner underlayment is desired, is Pliteq GenieMat RST05.** This product is 5mm (approximately 3/16") thick, and would likely achieve an AIIC rating of 49 to 50 when used under hard surface flooring at Vizcaya of Bradenton.
6. **In kitchens, bathrooms, and foyers, where hard surface flooring is likely desired for durability reasons, it is recommend that all new hard surface flooring located in these areas be installed with Pliteq GenieMat RST05 (minimum) or Pliteq GenieMat RST12 (preferred).**

Footfalls and other impact sounds will still be plainly audible in the units below with this product, but at levels that are 5 to 8 dB below those heard in Unit 27F.

Please do not hesitate to contact us if you have any questions regarding our recommendations or if we can be of additional assistance in this regard.

Sincerely,

***SIEBEIN ASSOCIATES, INC.***



Robert M. Lilkendey  
Associate Principal Consultant

## **APPENDIX A**

### **Manufacturer's Cut Sheets of Recommended Products**



# GENIEMAT™

**GenieMat™ RST  
Underlayment for  
Reduced Sound  
Transmission.**



**It's not magic, it's engineering.™**



# GenieMat™ RST

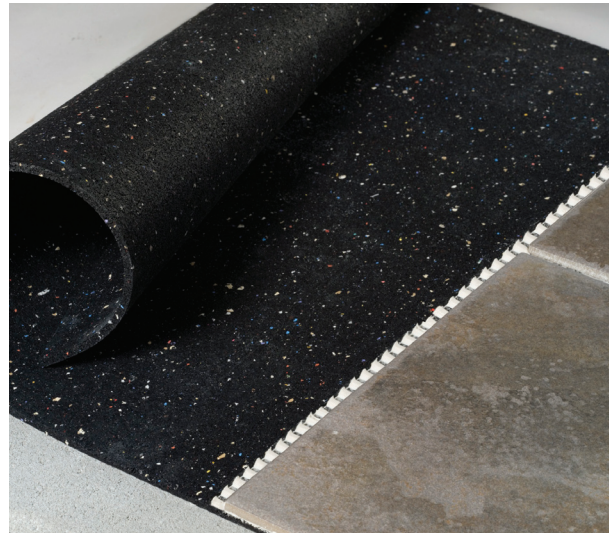
## Sound Control Underlayment

**From the inventor of the patented technology (US Patent RE41,495) for recycled rubber used for impact sound insulation, directly below floor coverings**

**GenieMat™ RST** is a flat, resilient, reduced sound transmission mat made from 94% recycled rubber content, used directly under hard surface floor finishes and over concrete and wood construction.

It is used when superior sound control is required in multi-family housing, high-rises, or commercial buildings and protects ceramic tile, porcelain and stone from substrate cracks.

Engineered for direct adhered floor coverings such as tile, stone, wood, vinyl, VCT, laminate etc.



**Tile** – Most products rated for commercial use.

**Wood** – Urethane adhesive gives superior peel strengths.

**Vinyl** – One-step method provides superior sound control for resilient floor coverings.

**ANSI** standard 118.12

**TCNA** standard (ASTM C627)

**IAQ** test (ASTM D5116)

**LEED** accreditation: up to 6 points

Full floor covering warranty available.

Product Specifications				
Product	Thickness	Roll Size	Roll Weight	Type A Hardness (ASTM D2240)
RST-02	2mm	4' x 75'	105 lbs	40 durometer
RST-05	5mm	4' x 30'	90 lbs	40 durometer
RST-10	10mm	4' x 15'	90 lbs	40 durometer
RST-12	12mm	4' x 15'	108 lbs	40 durometer
RST-15	15mm	4' x 15'	132 lbs	50 durometer

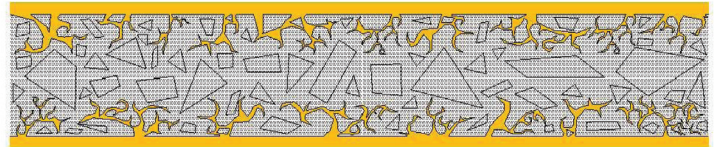
## Rubber is the BEST vibration isolation material

Dynamic Stiffness: 28 MN/m<sup>3</sup> (102lb/in<sup>3</sup>)

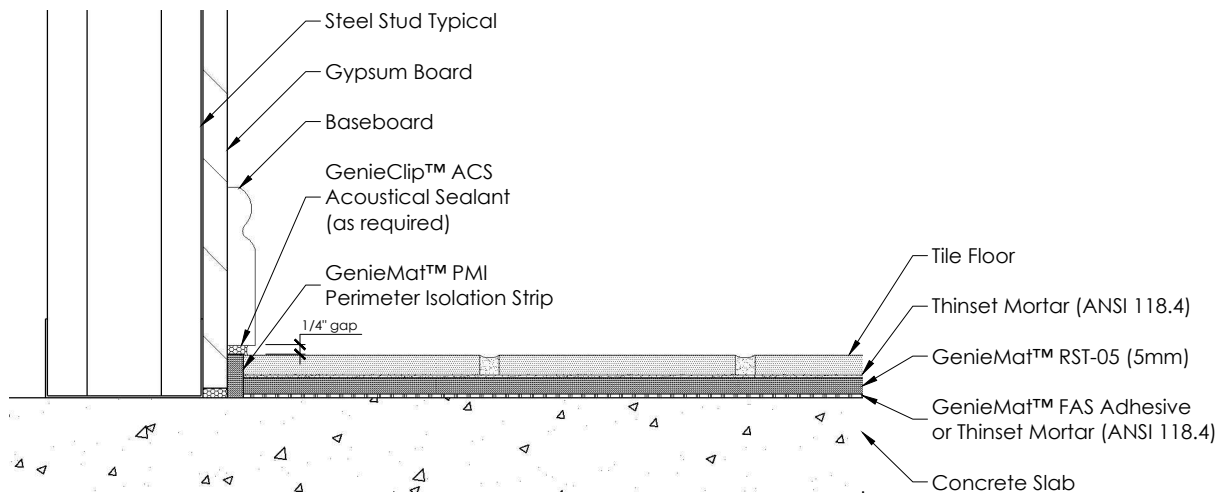
Compression Set: 4%

Loss Factor for Damping: 20%

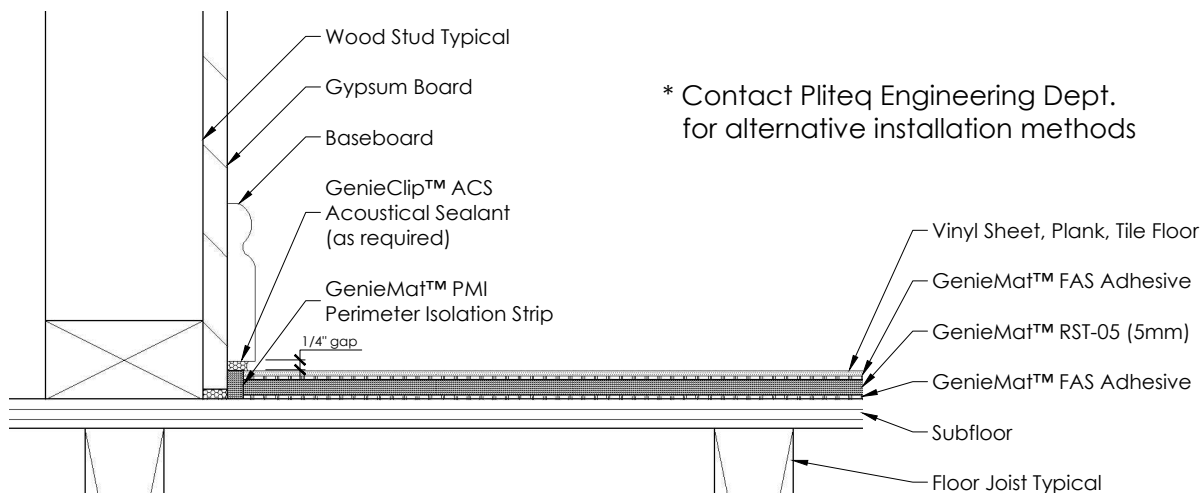
**Positive adhesive lock** – for very high bond strengths with adhered floor coverings.



### Tile Floor

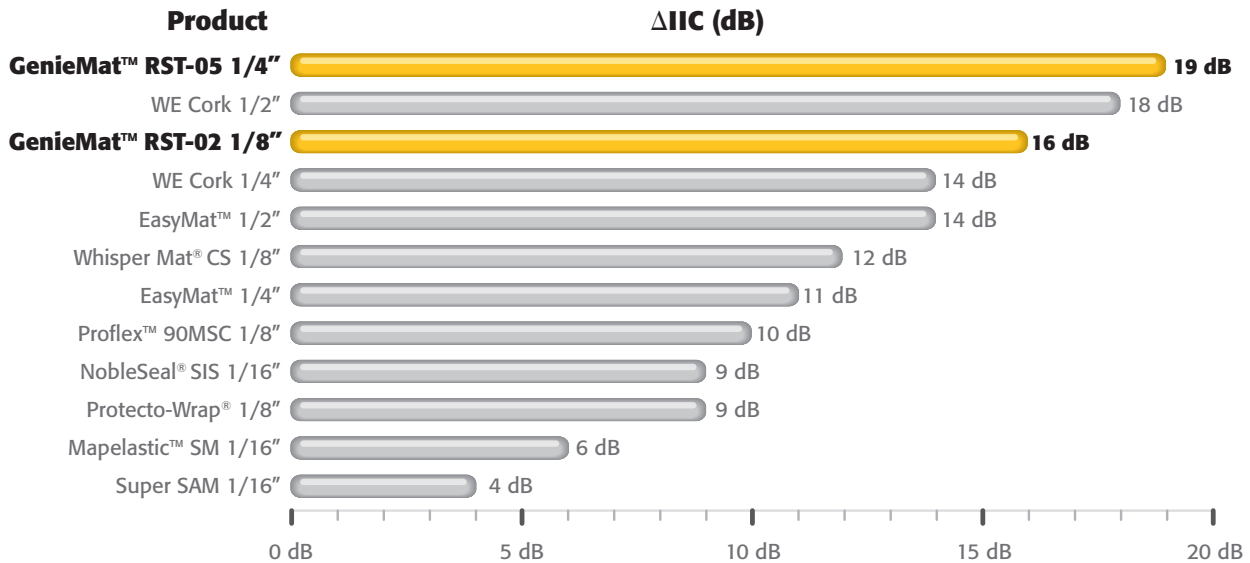


### Vinyl Sheet, Plank, Tile Floor

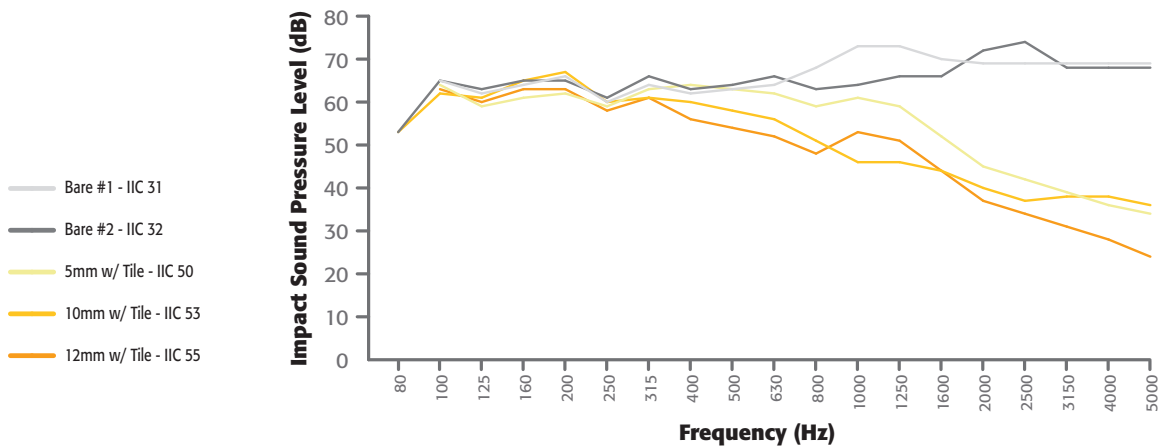




## ASTM E2179 – Effectiveness of resilient underlayment at improving Impact Insulation Class (6" concrete slab with tile)



## ASTM E492 – Acoustical test results of various thicknesses of GenieMat™ RST (8" concrete slab)



## ASTM E492 – Impact Insulation Class with variable floor coverings (concrete slab)

GenieMat Product	Floor	Ceiling	Concrete Slab	IIC Rating
RST-02	Tile	No	8"	48
RST-05	Tile	No	8"	50
RST-10	Tile	No	8"	53
RST-12	Tile	No	8"	55
RST-05 with GenieClips	Tile	Yes	8"	57
RST-10 with GenieClips	Tile	Yes	8"	60
RST-02	Wood	No	8"	54
RST-05	Vinyl	No	6"	53
RST-10	Tile	No	6"	52

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 The information provided is accurate to the best of our knowledge at the time of printing.  
 However, we reserve the right to make changes when necessary without notification.

