



# Acoustical Testing Laboratory



Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code 200291

## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test ASTM E 492 – 04 / ASTM E 989 – 06 On

Vinyl Sheet Flooring on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
RSIC-1™ Isolation Clips, Hat Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Page 1 of 4

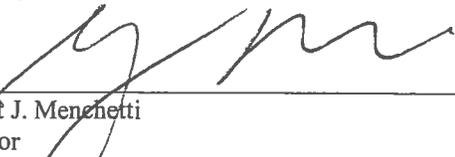
Report Number: NGC 7009099

Assignment Number: G-507

Test Date: 09/15/2009

Report Date: 10/12/2009

Submitted by:   
Craig G. Cooper  
Test Engineer

Reviewed by:   
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.

Report Number: NGC 7009099

**Test Method:** This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

**Specimen Description:** According to client: Vinyl Sheet Flooring on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, RSIC-1™ isolation clips, hat channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 1.6mm (0.065 in.) Armstrong Traditions vinyl sheet flooring. (0.30 PSF)  
Vinyl attached to floor in tapping machine area and perimeter with double sided tape.
- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 1 layer of Pac International RSIC-1™ clips. The clips were attached to the bottom of the joists, 610mm (24 in.) o.c. along each joist and offset by 304.8mm (12 in.) between adjacent joists resulting in clips being 1219mm (48 in.) o.c. in a line perpendicular to the joists for hanging each hat channel spaced 304.8mm (12 in.) o.c. Installed with 41.3mm (1-5/8 in.) #10 Tek screws. Sample weight was 0.21 kg/m<sup>2</sup> (0.04 PSF).
- 22mm (7/8 in.) 25 gauge (0.026 in.) metal hat channel, installed 609.6mm (12 in.) o.c. 0.27 kg/m (0.18 PLF) 0.51 kg/m<sup>2</sup> (0.10 PSF), attached perpendicular to joists.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 53.8 kg/m<sup>2</sup> (11.03 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

**Specimen size:** 3658mm x 4877mm (12 ft. x 16 ft.)

**Conditioning:** Test samples were submitted by client and tested as received.

**Test Results:** The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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Normalized impact sound pressure level						
Test: ASTM E 492 - 04 / ASTM E 989 - 06						
Test Report: NGC7009099				Date: 9/15/2009		Page 3 of 4
Specimen Size [m <sup>2</sup> ]:		17.8				
<b>Source room</b>			<b>Receiving room</b>			
Rm Temp [°C]: 22.5			Volume [m <sup>3</sup> ]: 61.6			
Humidity [%]: 59			Rm Temp [°C]: 22			
			Humidity [%]: 51			
<b>Impact Insulation Class IIC [dB]:</b>			<b>47</b>			
Sum of Unfavorable Deviations [dB]:			23			
Max. Unfavorable Deviation [dB]:			6 at 100 Hz			
Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	71	31.3	2.46	39.7	6	1.84
125	64	38.2	2.93	25.8		1.47
160	67	34.2	3.53	32.8	2	2.04
200	66	25.8	3.28	40.2	1	0.77
250	66	25.1	2.99	40.9	1	0.41
315	66	27.5	2.72	38.5	1	0.36
400	67	36.8	2.77	30.2	3	0.28
500	66	36.0	2.42	30.0	3	0.16
630	65	33.4	2.18	31.6	3	0.16
800	63	26.8	2.16	36.2	2	0.16
1000	61	19.1	2.02	41.9	1	0.16
1250	54	15.4	1.90	38.6		0.13
1600	50	15.5	1.78	34.5		0.13
2000	47	14.7	1.61	32.3		0.28
2500	43	15.2	1.54	27.8		0.16
3150	37	13.8	1.44	23.2		0.10
4000	30	12.2	1.30	17.8		0.19
5000	26	10.2	1.15	15.8		0.20
L <sub>n</sub> = Normalized Sound Pressure Level, dB L2 = Receiving Room Level, dB d = Decay Time, dB/second ΔL <sub>n</sub> = Uncertainty for 95% Confidence Level						

The results reported above apply to specific samples submitted for measurement.  
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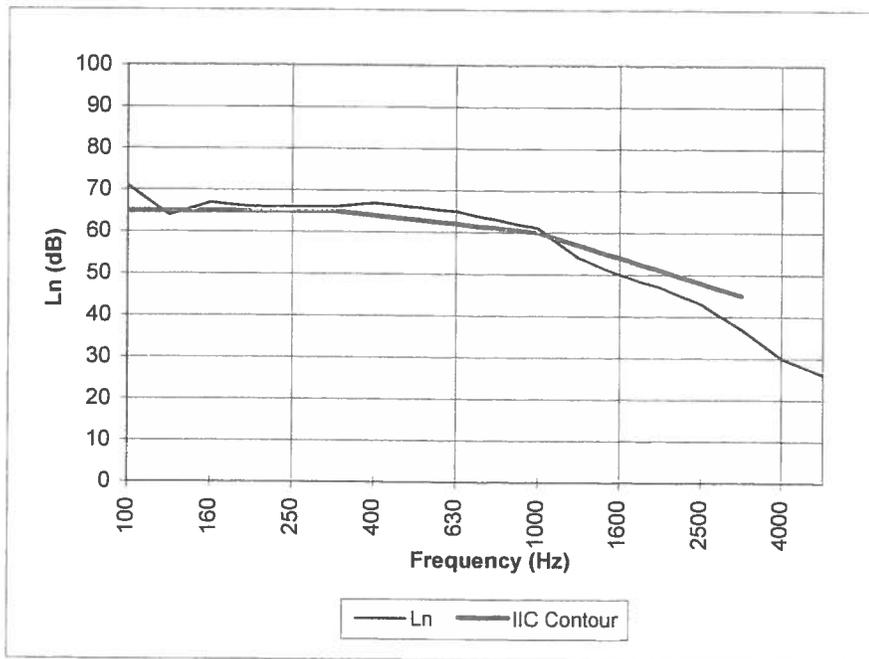
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009099  
 Test Date: 9/15/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 47**

Frequency [Hz]	L <sub>n</sub> [dB]
100	71
125	64
160	67
200	66
250	66
315	66
400	67
500	66
630	65
800	63
1000	61
1250	54
1600	50
2000	47
2500	43
3150	37
4000	30
5000	26



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

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under Lab Code 200291

## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Sound Transmission Loss Test

ASTM E 90 - 04 / E 413 - 04

On

DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
RSIC-1™ Isolation Clips, Hat Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Report Number: NGC 5009051

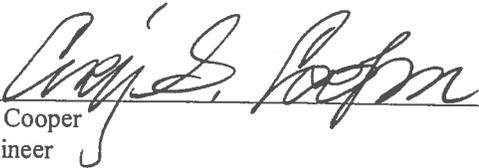
Page 1 of 4

Assignment Number: G-507

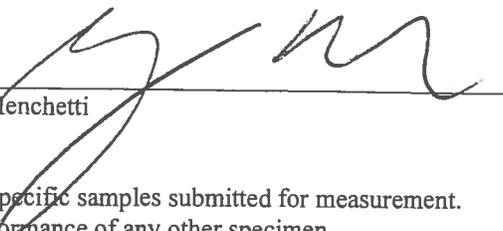
Test Date: 09/11/2009

Report Date: 10/12/2009

Submitted by: \_\_\_\_\_

  
Craig G. Cooper  
Test Engineer

Reviewed by: \_\_\_\_\_

  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement.

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# Acoustical Testing Laboratory



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Report Number: NGC 5009051

Test Method: This test method conforms explicitly with the American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements - Designation: E 90 - 04 / E 413 - 04.

Specimen Description: According to client: DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, RSIC-1™ isolation clips, hat channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 1 layer of Pac International RSIC-1™ clips. The clips were attached to the bottom of the joists, 609.6mm (24 in.) o.c. along each joist and offset by 304.8mm (12 in.) between adjacent joists resulting in clips being 1219mm (48 in.) o.c. in a line perpendicular to the joists for hanging each hat channel spaced 304.8mm (12 in.) o.c. Installed with 41.3mm (1-5/8 in.) #10 Tek screws. Sample weight was 0.21 kg/m<sup>2</sup> (0.04 PSF).
- 22mm (7/8 in.) 25 gauge (0.026 in.) metal hat channel, installed 304.8mm (12 in.) o.c. 0.27 kg/m (0.18 PLF) 0.51 kg/m<sup>2</sup> (0.10 PSF), attached perpendicular to joists.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 52.4 kg/m<sup>2</sup> (10.73 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

Specimen size: 3658mm x 4877mm (12 ft. x 16 ft.)

Conditioning: Test samples were submitted by client and tested as received.

Test Results: The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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## Sound Transmission Loss Test Data

Test: ASTM E 90 - 04 / ASTM E 413 - 04

Test Report: NGC5009051

Date: 9/11/2009

Specimen Size [m<sup>2</sup>]: 17.8

### Source room

Volume [m<sup>3</sup>]: 53.2

Rm Temp [°C]: 22

Humidity [%]: 46

### Receiving room

Volume [m<sup>3</sup>]: 61.6

Rm Temp [°C]: 22.5

Humidity [%]: 50

Sound Transmission Class **STC [dB]: 59**

Sum of Unfavorable Deviations [dB]: 20

Max. Unfavorable Deviation [dB]: 3 at 400 Hz

Frequency [Hz]	STL [dB]	L1 [dB]	L2 [dB]	d [dB/s]	Corr. [dB]	u.Dev. [dB]	ΔSTL
100	37	94.7	65.9	21.3	8.2		1.18
125	42	95.4	60.7	20.5	7.3	1	2.37
160	44	96.7	62.7	16.4	10.0	2	1.52
200	48	99.3	58.6	17.6	7.3	1	0.56
250	51	98.2	55.9	19.7	8.7	1	1.10
315	54	99.8	52.6	21.2	6.8	1	0.52
400	55	98.2	50.0	21.8	6.8	3	0.41
500	57	97.6	46.8	25.2	6.2	2	0.58
630	59	97.9	44.2	27.2	5.3	1	0.42
800	60	97.4	42.9	28.0	5.5	1	0.61
1000	59	94.0	40.9	29.1	5.9	3	0.47
1250	60	94.8	40.8	31.7	6.0	3	0.48
1600	62	95.2	39.2	33.7	6.0	1	0.61
2000	63	98.8	40.3	37.1	4.5		0.55
2500	65	98.9	38.4	39.1	4.5		0.76
3150	70	98.0	32.9	42.0	4.9		0.87
4000	74	99.5	29.4	46.5	3.9		1.24
5000	77	90.6	18.1	52.0	4.5		1.36

STL = Sound Transmission Loss, dB  
 L1 = Source Room Level, dB  
 L2 = Receiving Room Level, dB  
 d = Decay Time, dB/second  
 Δ STL = Uncertainty for 95% Confidence Level

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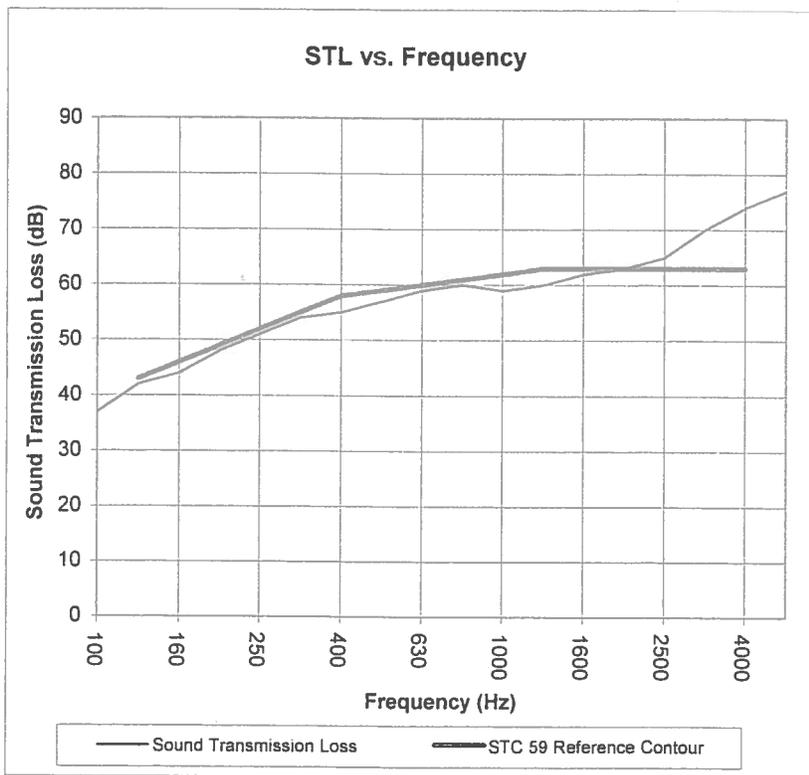
## Sound Transmission Loss Test Data

Per: ASTM E 90 - 04 / ASTM E 413 - 04

Test Report: NGC5009051  
 Test Date: 9/11/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Sound Transmission Class STC = 59 dB**

Frequency [Hz]	STL [dB]	ΔSTL
100	37	1.18
125	42	2.37
160	44	1.52
200	48	0.56
250	51	1.10
315	54	0.52
400	55	0.41
500	57	0.58
630	59	0.42
800	60	0.61
1000	59	0.47
1250	60	0.48
1600	62	0.61
2000	63	0.55
2500	65	0.76
3150	70	0.87
4000	74	1.24
5000	77	1.36



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

STL = Sound Transmission Loss, dB  
 Δ STL = Uncertainty for 95% Confidence Level

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## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test ASTM E 492 – 04 / ASTM E 989 – 06 On

DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
Resilient Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Report Number: NGC 7009079

Page 1 of 4

Assignment Number: G-507

Test Date: 08/25/2009

Report Date: 09/28/2009

Submitted by: Craig G. Cooper  
Craig G. Cooper  
Test Engineer

Reviewed by: Robert J. Menchetti  
Robert J. Menchetti  
Director

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Report Number: NGC 7009079

Test Method: This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

Specimen Description: According to client: DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, resilient channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 24 gauge SS – RC1 resilient channel. Sample weight was of 0.26 kg/M. (0.17 PLF), 0.86 kg/m<sup>2</sup> (0.18 PSF). Channels were mounted perpendicular to joist bottoms at 304.8mm (12 in.) o.c. and attached with 31.7mm (1-1/4 in.) fine thread bugle head screws.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to resilient channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 52.6 kg/m<sup>2</sup> (10.77 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

Specimen size: 3658mm x 4877mm (12 ft. x 16 ft.)

Conditioning: Test samples were submitted by client and tested as received.

Test Results: The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

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Normalized impact sound pressure level						
Test: ASTM E 492 - 04 / ASTM E 989 - 06						
Test Report: NGC7009079					Date: 8/25/2009	
Specimen Size [m <sup>2</sup> ]: 17.8					Page 3 of 4	
<b>Source room</b>			<b>Receiving room</b>			
Rm Temp [°C]: 23			Volume [m <sup>3</sup> ]: 61.2			
Humidity [%]: 63			Rm Temp [°C]: 23			
			Humidity [%]: 57			
<b>Impact Insulation Class IIC [dB]:</b>			<b>29</b>			
Sum of Unfavorable Deviations [dB]:			18			
Max. Unfavorable Deviation [dB]:			8 at 2500 Hz			
Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	76	36.8	2.68	39.2		1.99
125	73	39.1	2.38	33.9		2.44
160	71	36.7	3.38	34.3		2.24
200	72	32.5	3.45	39.5		0.82
250	72	31.2	2.96	40.8		0.37
315	71	29.8	2.71	41.2		0.38
400	72	37.7	2.54	34.3		0.30
500	71	34.8	2.20	36.2		0.20
630	71	32.5	2.02	38.5		0.22
800	70	28.1	2.03	41.9		0.17
1000	70	24.1	1.93	45.9		0.15
1250	69	23.1	1.79	45.9		0.18
1600	70	23.1	1.73	46.9		0.22
2000	71	22.6	1.57	48.4	2	0.24
2500	74	22.9	1.46	51.1	8	0.18
3150	71	22.3	1.40	48.7	8	0.18
4000	67	22.8	1.28	44.2		0.29
5000	63	18.3	1.17	44.7		0.26

L<sub>n</sub> = Normalized Sound Pressure Level, dB  
 L2 = Receiving Room Level, dB  
 d = Decay Time, dB/second  
 ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level

The results reported above apply to specific samples submitted for measurement.  
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## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

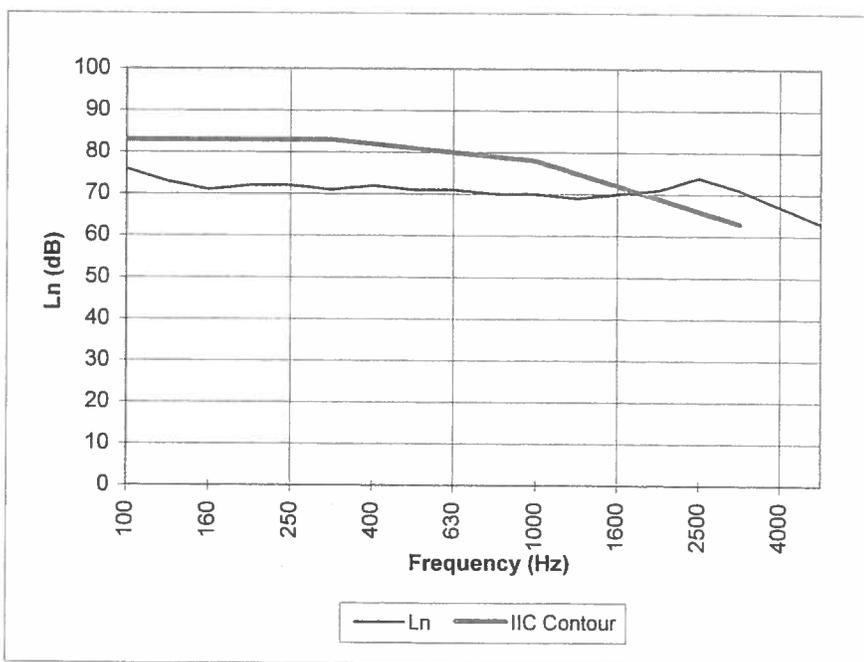
Test Report: NGC7009079

Test Date: 8/25/2009

Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 29**

Frequency [Hz]	L <sub>n</sub> [dB]
100	76
125	73
160	71
200	72
250	72
315	71
400	72
500	71
630	71
800	70
1000	70
1250	69
1600	70
2000	71
2500	74
3150	71
4000	67
5000	63



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

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# Acoustical Testing Laboratory



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Laboratory Accreditation Program  
for the specific scope of accreditation  
under Lab Code 200291

## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test

ASTM E 492 - 04 / ASTM E 989 - 06

On

Carpet and Padding on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
Resilient Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Report Number: NGC 7009080

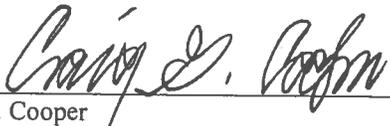
Page 1 of 4

Assignment Number: G-507

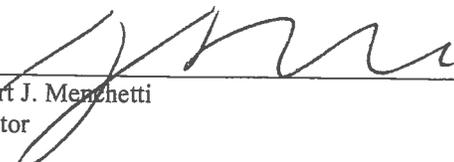
Test Date: 08/26/2009

Report Date: 09/29/2009

Submitted by:

  
\_\_\_\_\_  
Craig G. Cooper  
Test Engineer

Reviewed by:

  
\_\_\_\_\_  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement.  
No responsibility is assumed for performance of any other specimen.  
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or endorsement by NVLAP or any agency of the U.S. Government.

Report Number: NGC 7009080

Test Method: This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 - 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

Specimen Description: According to client: Carpet and Padding on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, resilient channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 44 oz. 11.1mm (0.437 in.) thick carpet. 2.7 kg/m<sup>2</sup> (0.56 PSF)
- 1 layer of 9.5mm (0.375 in.) foam rubber underlayment 2.3 kg/m<sup>2</sup> (0.48 PSF)
- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 24 gauge SS - RC1 resilient channel. Sample weight was of 0.26 kg/M. (0.17 PLF), 0.86 kg/m<sup>2</sup> (0.18 PSF). Channels were mounted perpendicular to joist bottoms at 304.8mm (12 in.) o.c. and attached with 31.7mm (1-1/4 in.) fine thread bugle head screws.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to resilient channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 57.7 kg/m<sup>2</sup> (11.81 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

Specimen size: 3658mm x 4877mm (12 ft. x 16 ft.)

Conditioning: Test samples were submitted by client and tested as received.

Test Results: The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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Normalized impact sound pressure level						
Test: ASTM E 492 - 04 / ASTM E 989 - 06						
Test Report: NGC7009080						Page 3 of 4
Specimen Size [m <sup>2</sup> ]: 17.8						Date: 8/26/2009
<b>Source room</b>			<b>Receiving room</b>			
Rm Temp [°C]: 24			Volume [m <sup>3</sup> ]: 61.2			
Humidity [%]: 65			Rm Temp [°C]: 23			
			Humidity [%]: 57			
<b>Impact Insulation Class IIC [dB]:</b>			<b>57</b>			
Sum of Unfavorable Deviations [dB]:			8			
Max. Unfavorable Deviation [dB]:			8 at 100 Hz			
Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	63	36.8	2.68	26.2	8	2.01
125	53	39.1	2.38	13.9		2.27
160	48	36.7	3.38	11.3		2.04
200	43	32.5	3.45	10.5		0.90
250	41	31.2	2.96	9.8		0.74
315	36	29.8	2.71	6.2		0.54
400	38	37.7	2.54	0.3		0.63
500	34	34.8	2.20	-0.8		0.36
630	30	32.5	2.02	-2.5		0.45
800	25	28.1	2.03	-3.1		0.44
1000	21	24.1	1.93	-3.1		0.40
1250	22	23.1	1.79	-1.1		1.88
1600	22	23.1	1.73	-1.1		0.76
2000	21	22.6	1.57	-1.6		0.39
2500	20	22.9	1.46	-2.9		0.46
3150	21	22.3	1.40	-1.3		0.42
4000	22	22.8	1.28	-0.8		0.52
5000	20	18.3	1.17	1.7		0.56
<p>L<sub>n</sub> = Normalized Sound Pressure Level, dB                      L2 = Receiving Room Level, dB                      d = Decay Time, dB/second                      ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level</p>						

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.

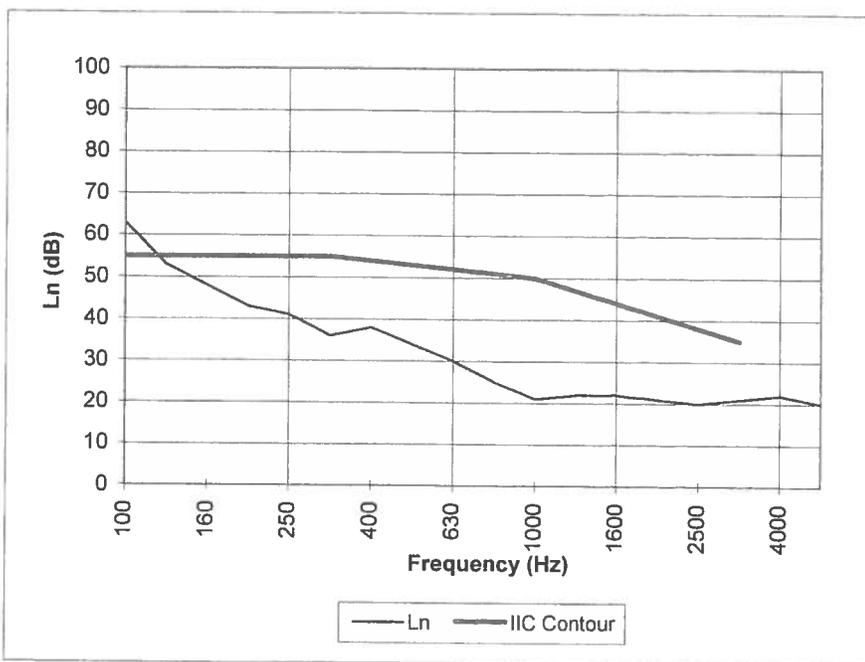
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009080  
 Test Date: 8/26/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 57**

Frequency [Hz]	L <sub>n</sub> [dB]
100	63
125	53
160	48
200	43
250	41
315	36
400	38
500	34
630	30
800	25
1000	21
1250	22
1600	22
2000	21
2500	20
3150	21
4000	22
5000	20



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

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# Acoustical Testing Laboratory



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under Lab Code 200291

## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test

ASTM E 492 - 04 / ASTM E 989 - 06

On

Vinyl Sheet Flooring on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
Resilient Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Report Number: NGC 7009081

Page 1 of 4

Assignment Number: G-507

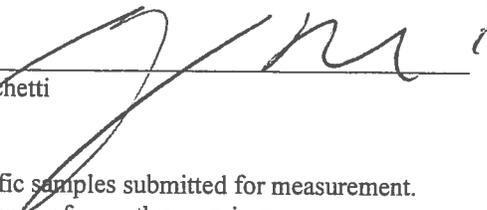
Test Date: 08/26/2009

Report Date: 09/29/2009

Submitted by: \_\_\_\_\_

  
Craig G. Cooper  
Test Engineer

Reviewed by: \_\_\_\_\_

  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement.  
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# Acoustical Testing Laboratory



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under Lab Code 200291

Page 2 of 4

Report Number: NGC 7009081

Test Method: This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 - 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

Specimen Description: According to client: Vinyl Sheet Flooring on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, resilient channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 1.6mm (0.065 in.) Armstrong Traditions vinyl sheet flooring. (0.30 PSF)  
Vinyl attached to floor in tapping machine area and perimeter with double sided tape.
- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 24 gauge SS - RC1 resilient channel. Sample weight was of 0.26 kg/M. (0.17 PLF), 0.86 kg/m<sup>2</sup> (0.18 PSF). Channels were mounted perpendicular to joist bottoms at 304.8mm (12 in.) o.c. and attached with 31.7mm (1-1/4 in.) fine thread bugle head screws.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to resilient channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 54 kg/m<sup>2</sup> (11.07 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

Specimen size: 3658mm x 4877mm (12 ft. x 16 ft.)

Conditioning: Test samples were submitted by client and tested as received.

Test Results: The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

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# Acoustical Testing Laboratory



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## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Page 3 of 4

Test Report: NGC7009081 Date: 8/26/2009

Specimen Size [m<sup>2</sup>]: 17.8

### Source room

Rm Temp [°C]: 24  
Humidity [%]: 66

### Receiving room

Volume [m<sup>3</sup>]: 61.2  
Rm Temp [°C]: 23  
Humidity [%]: 57

**Impact Insulation Class IIC [dB]: 41**

Sum of Unfavorable Deviations [dB]: 22

Max. Unfavorable Deviation [dB]: 6 at 100 Hz

Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	77	41.3	2.68	35.7	6	1.74
125	74	39.5	2.38	34.5	3	2.70
160	72	37.2	3.38	34.8	1	1.99
200	73	29.1	3.45	43.9	2	0.83
250	73	25.2	2.96	47.8	2	0.47
315	72	29.3	2.71	42.7	1	0.54
400	72	37.2	2.54	34.8	2	0.32
500	71	34.0	2.20	37.0	2	0.21
630	70	33.5	2.02	36.5	2	0.33
800	67	27.5	2.03	39.5		0.22
1000	66	23.7	1.93	42.3		0.23
1250	62	24.4	1.79	37.6		0.19
1600	60	21.4	1.73	38.6		0.23
2000	57	20.7	1.57	36.3		0.28
2500	55	21.9	1.46	33.1	1	0.20
3150	49	20.2	1.40	28.8		0.32
4000	45	21.0	1.28	24.0		0.31
5000	40	17.2	1.17	22.8		0.29

L<sub>n</sub> = Normalized Sound Pressure Level, dB  
 L2 = Receiving Room Level, dB  
 d = Decay Time, dB/second  
 ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.

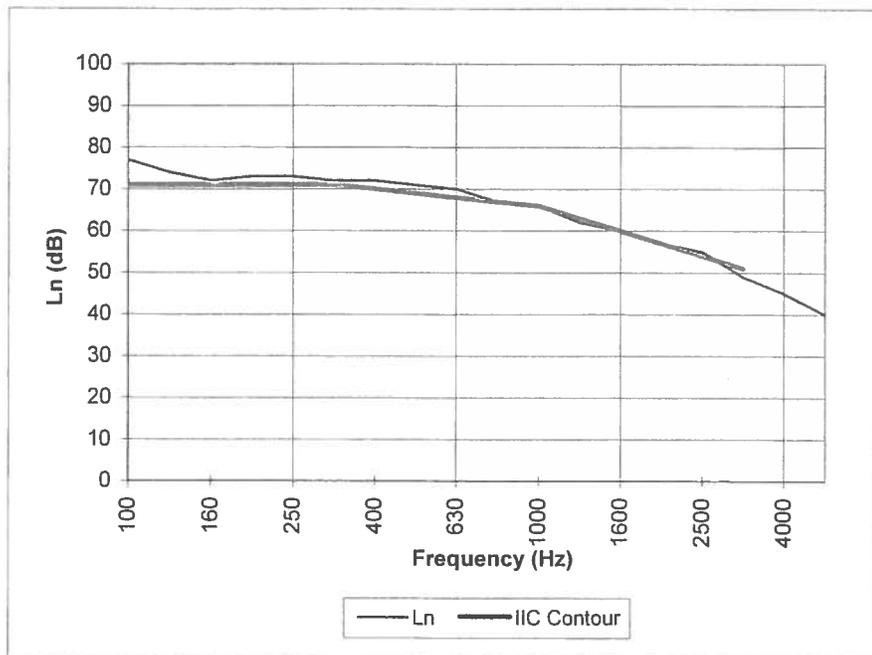
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009081  
 Test Date: 8/26/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 41**

Frequency [Hz]	L <sub>n</sub> [dB]
100	77
125	74
160	72
200	73
250	73
315	72
400	72
500	71
630	70
800	67
1000	66
1250	62
1600	60
2000	57
2500	55
3150	49
4000	45
5000	40



L<sub>n</sub> = Normalized Sound Pressure Level, dB

\* Due to high insulating value of specimen, background levels limit results at these frequencies.

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.



# Acoustical Testing Laboratory



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## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test

ASTM E 492 - 04 / ASTM E 989 - 06

On

Laminate Flooring on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
Resilient Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Page 1 of 4

Report Number: NGC 7009082

Assignment Number: G-507

Test Date: 08/27/2009

Report Date: 09/29/2009

Submitted by: Craig G. Cooper  
Craig G. Cooper  
Test Engineer

Reviewed by: Robert J. Menchetti  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement.  
No responsibility is assumed for performance of any other specimen.  
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**Test Method:** This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

**Specimen Description:** According to client: Laminate Flooring on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, resilient channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 9.9mm (0.39 in.) laminate flooring. Samples were 197mm (7-3/4 in.) wide, by 1219mm (48 in.) long planks. Sample weight was 9.5 kg/m<sup>2</sup> (1.96 PSF).
- 1 layer of 2.16mm (0.085 in.) foam underlayment 0.78 kg/m<sup>2</sup> (0.16 PSF)
- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8 (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 24 gauge SS – RC1 resilient channel. Sample weight was of 0.26 kg/M. (0.17 PLF), 0.86 kg/m<sup>2</sup> (0.18 PSF). Channels were mounted perpendicular to joist bottoms at 304.8mm (12 in.) o.c. and attached with 31.7mm (1-1/4 in.) fine thread bugle head screws.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to resilient channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 62.9 kg/m<sup>2</sup> (12.89 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

**Specimen size:** 3658mm x 4877mm (12 ft. x 16 ft.)  
**Conditioning:** Test samples were submitted by client and tested as received.  
**Test Results:** The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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# Acoustical Testing Laboratory



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## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Page 3 of 4

Test Report: NGC7009082 Date: 8/27/2009

Specimen Size [m<sup>2</sup>]: 17.8

### Source room

Rm Temp [°C]: 22.5

Humidity [%]: 61

### Receiving room

Volume [m<sup>3</sup>]: 61.2

Rm Temp [°C]: 23

Humidity [%]: 57

**Impact Insulation Class IIC [dB]: 43**

Sum of Unfavorable Deviations [dB]: 13

Max. Unfavorable Deviation [dB]: 8 at 100 Hz

Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	77	34.1	2.68	42.9	8	1.78
125	73	40.5	2.38	32.5	4	2.04
160	70	33.5	3.38	36.5	1	1.67
200	69	28.9	3.45	40.1		0.86
250	69	29.6	2.96	39.4		0.40
315	66	31.9	2.71	34.1		0.40
400	65	37.1	2.54	27.9		0.25
500	60	35.2	2.20	24.8		0.25
630	54	35.9	2.02	18.1		0.24
800	48	27.9	2.03	20.1		0.17
1000	47	24.9	1.93	22.1		0.22
1250	45	23.8	1.79	21.2		0.14
1600	45	23.1	1.73	21.9		0.23
2000	44	22.2	1.57	21.8		0.28
2500	45	21.4	1.46	23.6		0.22
3150	41	20.9	1.40	20.1		0.16
4000	36	21.7	1.28	14.3		0.27
5000	31	18.4	1.17	12.6		0.29

L<sub>n</sub> = Normalized Sound Pressure Level, dB  
 L2 = Receiving Room Level, dB  
 d = Decay Time, dB/second  
 ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level

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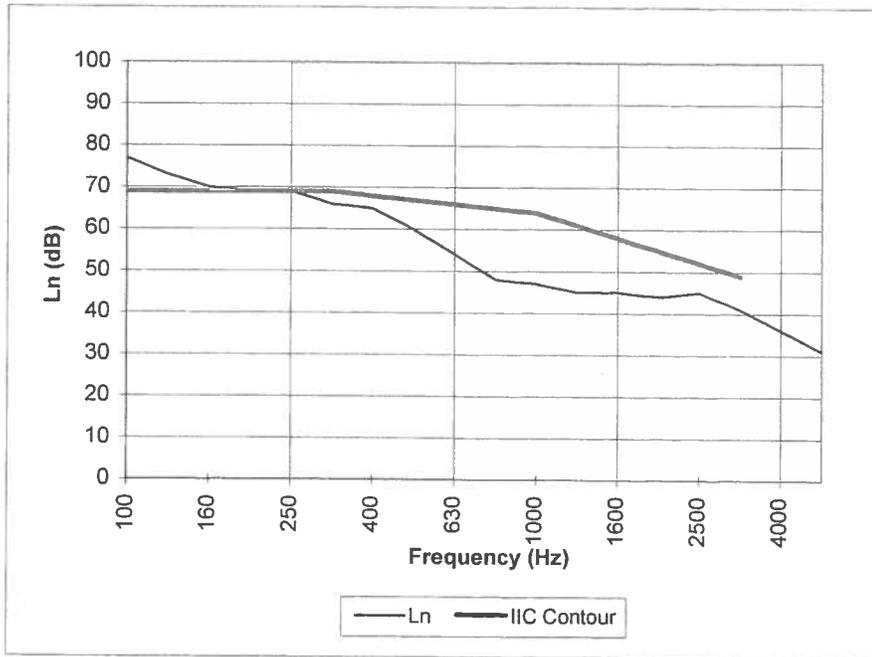
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009082  
 Test Date: 8/27/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 43**

Frequency [Hz]	L <sub>n</sub> [dB]
100	77
125	73
160	70
200	69
250	69
315	66
400	65
500	60
630	54
800	48
1000	47
1250	45
1600	45
2000	44
2500	45
3150	41
4000	36
5000	31



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

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# Acoustical Testing Laboratory



Accredited by the National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code 200291

## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test ASTM E 492 - 04 / ASTM E 989 - 06 On

Quarry Tile Flooring on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
RSIC-1™ Isolation Clips, Hat Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Report Number: NGC 7009085

Assignment Number: G-507

Test Date: 09/11/2009

Report Date: 09/30/2009

Submitted by: Craig G. Cooper  
Craig G. Cooper  
Test Engineer

Reviewed by: Robert J. Menchetti  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.

Report Number: NGC 7009085

**Test Method:** This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

**Specimen Description:** According to client: Quarry Tile Flooring on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, RSIC-1™ isolation clips, hat channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 152mm x 152mm x 12.7mm (6 in. x 6 in. x 1/2 in.) unglazed clay quarry tile 27.3 kg/m<sup>2</sup> (5.6 PSF) installed using latex-modified Thin-set mortar and latex-modified sanded grout mixtures 4.9 kg/m<sup>2</sup> (1.0 PSF).
- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 1 layer of Pac International RSIC-1™ clips. The clips were attached to the bottom of the joists, 609.6mm (24 in.) o.c. along each joist and offset by 304.8mm (12 in.) between adjacent joists resulting in clips being 1219mm (48 in.) o.c. in a line perpendicular to the joists for hanging each hat channel spaced 304.8mm (12 in.) o.c. Installed with 41.3mm (1-5/8 in.) #10 Tek screws. Sample weight was 0.21 kg/m<sup>2</sup> (0.04 PSF).
- 22mm (7/8 in.) 25 gauge (0.026 in.) metal hat channel, installed 304.8mm (12 in.) o.c. 0.27 kg/m (0.18 PLF) 0.51 kg/m<sup>2</sup> (0.10 PSF), attached perpendicular to joists.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 84.6 kg/m<sup>2</sup> (17.33 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

**Specimen size:** 3658mm x 4877mm (12 ft. x 16 ft.)

**Conditioning:** Test samples were submitted by client and tested as received.

**Test Results:** The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Page 3 of 4

Test Report: NGC7009085

Date: 9/11/2009

Specimen Size [m<sup>2</sup>]: 17.8

### Source room

Rm Temp [°C]: 23

Humidity [%]: 49

### Receiving room

Volume [m<sup>3</sup>]: 61.6

Rm Temp [°C]: 22.5

Humidity [%]: 50

**Impact Insulation Class IIC [dB]: 50**

Sum of Unfavorable Deviations [dB]: 21

Max. Unfavorable Deviation [dB]: 8 at 2500 Hz

Frequency	L <sub>n</sub>	L <sub>2</sub>	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	64	33.1	2.81	30.9	2	1.87
125	57	39.5	2.92	17.5		2.28
160	62	36.8	3.65	25.2		1.77
200	59	29.6	3.42	29.4		0.77
250	61	26.7	3.05	34.3		0.37
315	60	27.4	2.82	32.6		0.34
400	61	35.2	2.76	25.8		0.36
500	60	35.6	2.38	24.4		0.28
630	59	36.7	2.20	22.3		0.24
800	57	26.4	2.15	30.6		0.21
1000	58	19.5	2.06	38.5	1	0.24
1250	52	17.5	1.89	34.5		0.21
1600	50	17.0	1.78	33.0		0.21
2000	52	14.3	1.62	37.7	4	0.29
2500	53	13.4	1.53	39.6	8	0.24
3150	48	12.3	1.43	35.7	6	0.22
4000	41	11.3	1.29	29.7		0.25
5000	36	9.3	1.15	26.7		0.26

L<sub>n</sub> = Normalized Sound Pressure Level, dB

L<sub>2</sub> = Receiving Room Level, dB

d = Decay Time, dB/second

ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

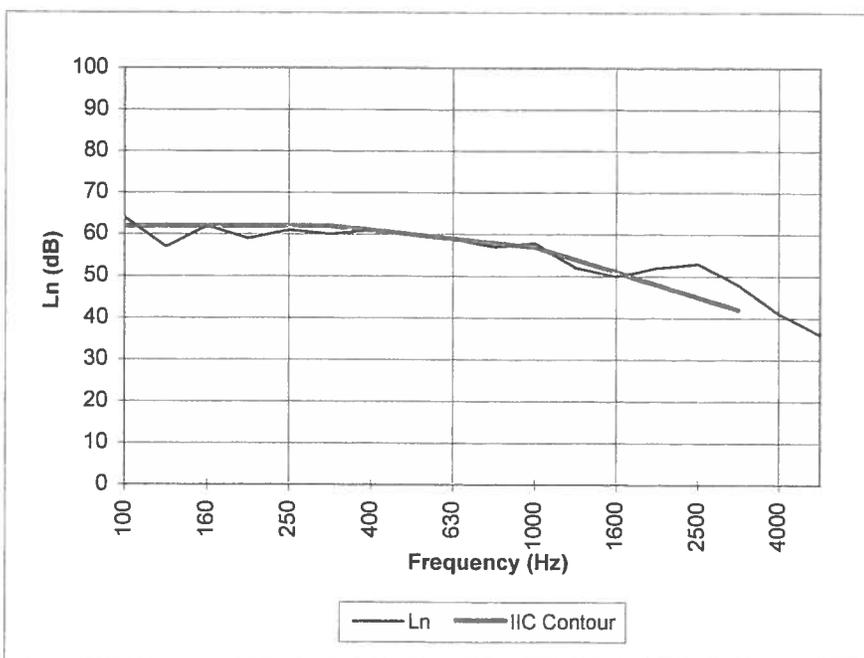
Test Report: NGC7009085

Test Date: 9/11/2009

Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 50**

Frequency [Hz]	L <sub>n</sub> [dB]
100	64
125	57
160	62
200	59
250	61
315	60
400	61
500	60
630	59
800	57
1000	58
1250	52
1600	50
2000	52
2500	53
3150	48
4000	41
5000	36



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

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# Acoustical Testing Laboratory



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## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test

ASTM E 492 – 04 / ASTM E 989 – 06

On

Quarry Tile Flooring on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
Resilient Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Page 1 of 4

Report Number: NGC 7009084

Assignment Number: G-507

Test Date: 09/04/2009

Report Date: 09/29/2009

Submitted by: Craig G. Cooper  
Craig G. Cooper  
Test Engineer

Reviewed by: Robert J. Menchetti  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement.  
No responsibility is assumed for performance of any other specimen.  
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**Test Method:** This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

**Specimen Description:** According to client: Quarry Tile Flooring on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, resilient channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 152mm x 152mm x 12.7mm (6 in. x 6 in. x ½ in.) unglazed clay quarry tile 27.3 kg/m<sup>2</sup> (5.6 PSF) installed using latex-modified Thin-set mortar and latex-modified sanded grout mixtures 4.9 kg/m<sup>2</sup> (1.0 PSF).
- 1 layer of 19mm (¾ in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 24 gauge SS – RC1 resilient channel. Sample weight was of 0.26 kg/M. (0.17 PLF), 0.86 kg/m<sup>2</sup> (0.18 PSF). Channels were mounted perpendicular to joist bottoms at 304.8mm (12 in.) o.c. and attached with 31.7mm (1-1/4 in.) fine thread bugle head screws.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to resilient channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 84.8 kg/m<sup>2</sup> (17.37 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

**Specimen size:** 3658mm x 4877mm (12 ft. x 16 ft.)  
**Conditioning:** Test samples were submitted by client and tested as received.  
**Test Results:** The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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# Acoustical Testing Laboratory



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## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Page 3 of 4

Test Report: NGC7009084

Date: 9/4/2009

Specimen Size [m<sup>2</sup>]: 17.8

### Source room

Rm Temp [°C]: 23.5

Humidity [%]: 55

### Receiving room

Volume [m<sup>3</sup>]: 61.2

Rm Temp [°C]: 23

Humidity [%]: 57

**Impact Insulation Class IIC [dB]: 34**

Sum of Unfavorable Deviations [dB]: 16

Max. Unfavorable Deviation [dB]: 8 at 3150 Hz

Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	74	36.8	2.12	37.2		2.40
125	67	38.0	2.55	29.0		2.10
160	68	30.2	3.32	37.8		1.78
200	67	28.9	3.34	38.1		0.76
250	68	27.9	3.01	40.1		0.46
315	66	27.1	2.71	38.9		0.35
400	67	36.7	2.60	30.3		0.28
500	66	35.7	2.22	30.3		0.23
630	65	34.6	2.05	30.4		0.25
800	64	26.5	1.99	37.5		0.22
1000	64	19.4	1.92	44.6		0.18
1250	63	16.7	1.83	46.3		0.28
1600	64	16.9	1.73	47.1		0.42
2000	65	14.9	1.56	50.1	1	0.31
2500	68	15.3	1.46	52.7	7	0.36
3150	66	14.7	1.40	51.3	8	0.26
4000	63	13.2	1.29	49.8		0.37
5000	59	11.0	1.17	48.0		0.24

L<sub>n</sub> = Normalized Sound Pressure Level, dB

L2 = Receiving Room Level, dB

d = Decay Time, dB/second

ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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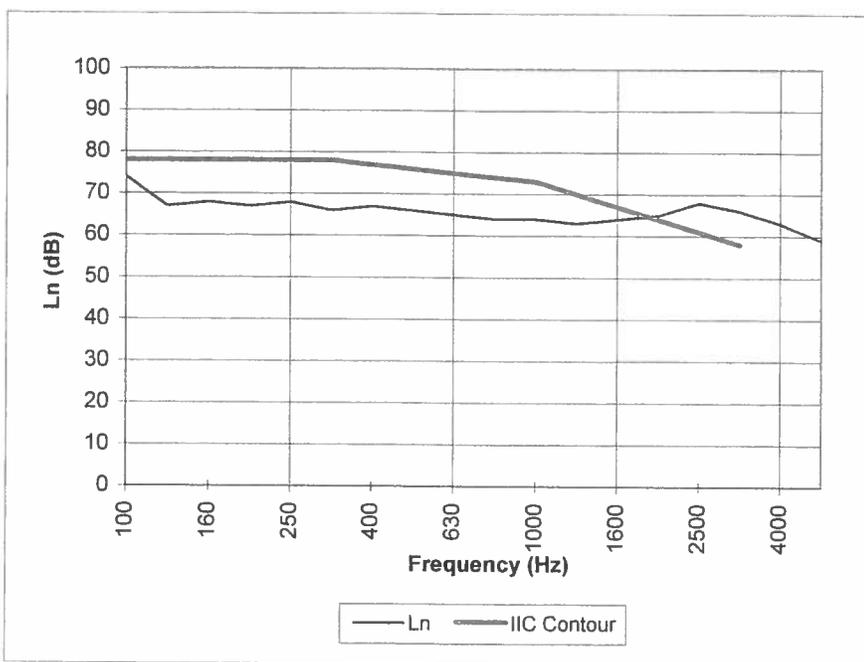
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009084  
 Test Date: 9/4/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 34**

Frequency [Hz]	L <sub>n</sub> [dB]
100	74
125	67
160	68
200	67
250	68
315	66
400	67
500	66
630	65
800	64
1000	64
1250	63
1600	64
2000	65
2500	68
3150	66
4000	63
5000	59



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.



# Acoustical Testing Laboratory



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for the specific scope of accreditation  
under Lab Code 200291

## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test

ASTM E 492 - 04 / ASTM E 989 - 06

On

DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
RSIC-1™ Isolation Clips, Hat Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Report Number: NGC 7009086

Page 1 of 4

Assignment Number: G-507

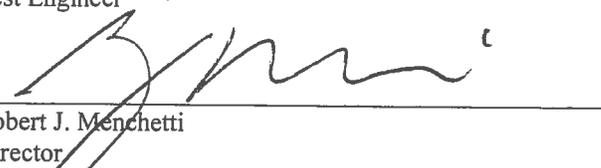
Test Date: 09/11/2009

Report Date: 10/12/2009

Submitted by:

  
Craig G. Cooper  
Test Engineer

Reviewed by:

  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement.  
No responsibility is assumed for performance of any other specimen.  
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or endorsement by NVLAP or any agency of the U.S. Government.

Report Number: NGC 7009086

**Test Method:** This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

**Specimen Description:** According to client: DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, RSIC-1™ isolation clips, hat channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 1 layer of Pac International RSIC-1™ clips. The clips were attached to the bottom of the joists, 609.6mm (24 in.) o.c. along each joist and offset by 305mm (12 in.) between adjacent joists resulting in clips being 1219mm (48 in.) o.c. in a line perpendicular to the joists for hanging each hat channel spaced 304.8mm (12 in.) o.c. Installed with 41.3mm (1-5/8 in.) #10 Tek screws. Sample weight was 0.21 kg/m<sup>2</sup> (0.04 PSF).
- 22mm (7/8 in.) 25 gauge (0.026 in.) metal hat channel, installed 304.8mm (12 in.) o.c. 0.27 kg/m (0.18 PLF) 0.51 kg/m<sup>2</sup> (0.10 PSF), attached perpendicular to joists.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 52.4 kg/m<sup>2</sup> (10.73 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

**Specimen size:** 3658mm x 4877mm (12 ft. x 16 ft.)  
**Conditioning:** Test samples were submitted by client and tested as received.  
**Test Results:** The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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Normalized impact sound pressure level						
Test: ASTM E 492 - 04 / ASTM E 989 - 06						
Test Report: NGC7009086					Page 3 of 4	
Specimen Size [m <sup>2</sup> ]: 17.8					Date: 9/11/2009	
<b>Source room</b>			<b>Receiving room</b>			
Rm Temp [°C]: 22.5			Volume [m <sup>3</sup> ]: 61.6			
Humidity [%]: 46			Rm Temp [°C]: 22.5			
			Humidity [%]: 50			
<b>Impact Insulation Class IIC [dB]: 43</b>						
Sum of Unfavorable Deviations [dB]: 19						
Max. Unfavorable Deviation [dB]: 8			at 2500 Hz			
Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	68	33.1	2.81	34.9		1.79
125	63	39.5	2.92	23.5		2.34
160	65	36.8	3.65	28.2		2.06
200	65	29.6	3.42	35.4		0.67
250	65	26.7	3.05	38.3		0.41
315	66	27.4	2.82	38.6		0.35
400	67	35.2	2.76	31.8		0.27
500	67	35.6	2.38	31.4		0.27
630	66	36.7	2.20	29.3		0.22
800	65	26.4	2.15	38.6		0.20
1000	64	19.5	2.06	44.5		0.23
1250	59	17.5	1.89	41.5		0.12
1600	58	17.0	1.78	41.0		0.13
2000	60	14.3	1.62	45.7	5	0.23
2500	60	13.4	1.53	46.6	8	0.23
3150	55	12.3	1.43	42.7	6	0.15
4000	47	11.3	1.29	35.7		0.20
5000	41	9.3	1.15	31.7		0.14
<p>L<sub>n</sub> = Normalized Sound Pressure Level, dB                      L2 = Receiving Room Level, dB                      d = Decay Time, dB/second                      ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level</p>						

The results reported above apply to specific samples submitted for measurement.  
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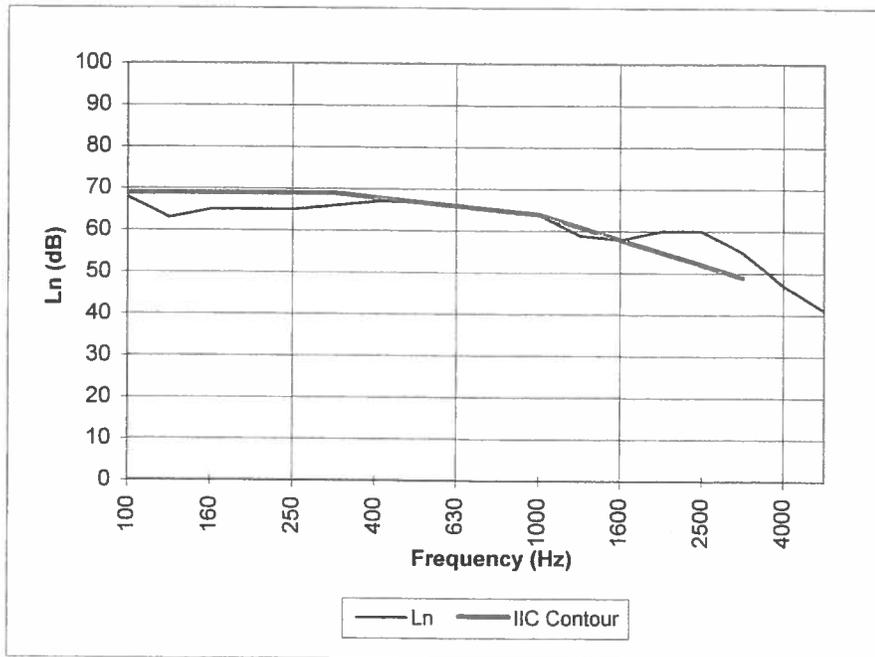
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009086  
 Test Date: 9/11/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 43**

Frequency [Hz]	L <sub>n</sub> [dB]
100	68
125	63
160	65
200	65
250	65
315	66
400	67
500	67
630	66
800	65
1000	64
1250	59
1600	58
2000	60
2500	60
3150	55
4000	47
5000	41



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

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# Acoustical Testing Laboratory



Accredited by the National Voluntary  
Laboratory Accreditation Program  
for the specific scope of accreditation  
under Lab Code 200291

## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test

ASTM E 492 – 04 / ASTM E 989 – 06

On

Carpet and Padding on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
RSIC-1™ Isolation Clips, Hat Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Page 1 of 4

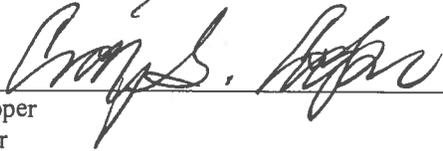
Report Number: NGC 7009087

Assignment Number: G-507

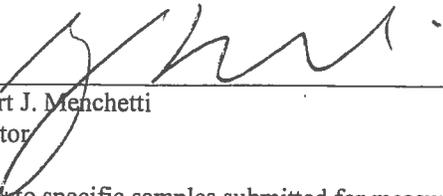
Test Date: 09/14/2009

Report Date: 10/12/2009

Submitted by: \_\_\_\_\_

  
Craig G. Cooper  
Test Engineer

Reviewed by: \_\_\_\_\_

  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement.  
No responsibility is assumed for performance of any other specimen.  
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or endorsement by NVLAP or any agency of the U.S. Government.

Report Number: NGC 7009087

**Test Method:** This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

**Specimen Description:** According to client: Carpet and Padding on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, RSIC-1™ isolation clips, hat channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 44 oz. 11.1mm (0.437 in.) thick carpet. 2.7 kg/m<sup>2</sup> (0.56 PSF)
- 1 layer of 9.5mm (0.375 in.) foam rubber underlayment 2.3 kg/m<sup>2</sup> (0.48 PSF)
- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 1 layer of Pac International RSIC-1™ clips. The clips were attached to the bottom of the joists, 610mm (24 in.) o.c. along each joist and offset by 304.8mm (12 in.) between adjacent joists resulting in clips being 1219mm (48 in.) o.c. in a line perpendicular to the joists for hanging each hat channel spaced 304.8mm (12 in.) o.c. Installed with 41.3mm (1-5/8 in.) #10 Tek screws. Sample weight was 0.21 kg/m<sup>2</sup> (0.04 PSF).
- 22mm (7/8 in.) 25 gauge (0.026 in.) metal hat channel, installed 609.6mm (12 in.) o.c. 0.27 kg/m (0.18 PLF) 0.51 kg/m<sup>2</sup> (0.10 PSF), attached perpendicular to joists.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 16.1mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 57.5 kg/m<sup>2</sup> (11.77 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

**Specimen size:** 3658mm x 4877mm (12 ft. x 16 ft.)  
**Conditioning:** Test samples were submitted by client and tested as received.  
**Test Results:** The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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Normalized impact sound pressure level						
Test: ASTM E 492 - 04 / ASTM E 989 - 06						
Test Report: NGC7009087					Date: 9/14/2009	
Specimen Size [m <sup>2</sup> ]: 17.8					Page 3 of 4	
Source room			Receiving room			
Rm Temp [°C]: 22.5			Volume [m <sup>3</sup> ]: 61.6			
Humidity [%]: 56			Rm Temp [°C]: 22			
			Humidity [%]: 51			
Impact Insulation Class IIC [dB]:			64			
Sum of Unfavorable Deviations [dB]:			8			
Max. Unfavorable Deviation [dB]:			8 at 100 Hz			
Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	56	31.3	2.46	24.7	8	2.10
125	44	38.2	2.93	5.8		2.00
160	43	34.2	3.53	8.8		1.99
200	35	25.8	3.28	9.2		0.62
250	34	25.1	2.99	8.9		0.47
315	31	27.5	2.72	3.5		0.42
400	32	36.8	2.77	-4.8		0.37
500	32	36.0	2.42	-4.0		0.50
630	30	33.4	2.18	-3.4		0.59
800	23	26.8	2.16	-3.8		0.51
1000	19	19.1	2.02	-0.1		0.53
1250	19	15.4	1.90	3.6		0.50
1600	20	15.5	1.78	4.5		0.47
2000	18	14.7	1.61	3.3		0.26
2500	18	15.2	1.54	2.8		0.23
3150	21	13.8	1.44	7.2		0.37
4000	22	12.2	1.30	9.8		0.40
5000	20	10.2	1.15	9.8		0.44

L<sub>n</sub> = Normalized Sound Pressure Level, dB  
 L2 = Receiving Room Level, dB  
 d = Decay Time, dB/second  
 ΔL<sub>n</sub> = Uncertainty for 95% Confidence Level

The results reported above apply to specific samples submitted for measurement.  
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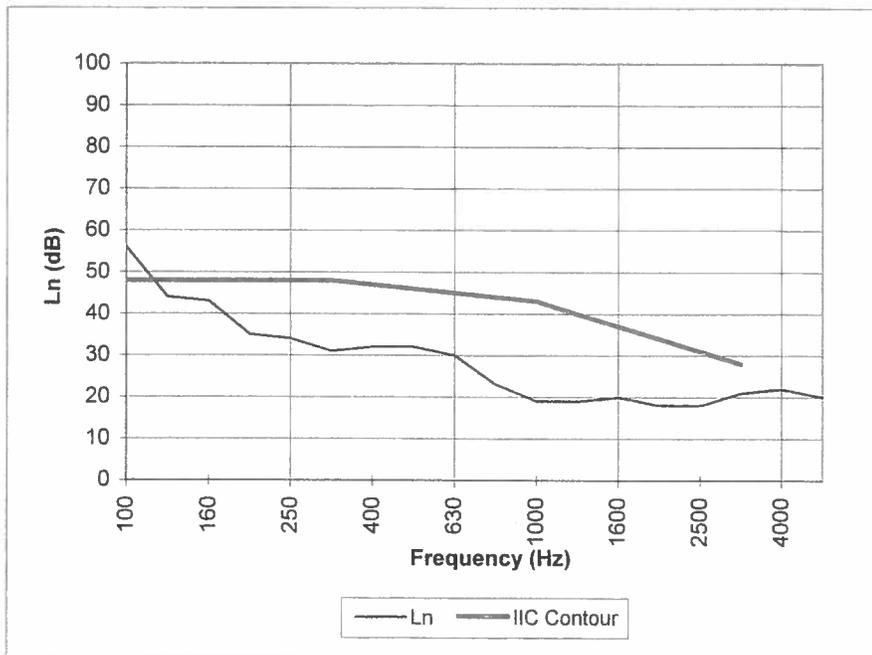
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009087  
 Test Date: 9/14/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 64**

Frequency [Hz]	L <sub>n</sub> [dB]
100	56
125	44
160	43
200	35
250	34
315	31
400	32
500	32
630	30
800	23
1000	19
1250	19
1600	20
2000	18
2500	18
3150	21
4000	22
5000	20



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.



# Acoustical Testing Laboratory



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## TEST REPORT

For

Dragon Board USA LLC  
2960 Woodbridge Avenue  
Edison, NJ 08837  
Sam Borgia / 570 840-4000

### Impact Sound Transmission Test ASTM E 492 – 04 / ASTM E 989 – 06 On

Laminate Flooring on DRAGONBOARD Attached to  
10 Inch Steel Joist Floor Ceiling Assembly, Including Insulation,  
RSIC-1™ Isolation Clips, Hat Channel and  
Two Layers of 5/8 Inch Type C Gypsum Board

Report Number: NGC 7009093

Assignment Number: G-507

Test Date: 09/17/2009

Report Date: 10/12/2009

Submitted by: Craig G. Cooper  
Craig G. Cooper  
Test Engineer

Reviewed by: Robert J. Menchetti  
Robert J. Menchetti  
Director

The results reported above apply to specific samples submitted for measurement. No responsibility is assumed for performance of any other specimen. This report may not be reproduced except in full, without the written approval of the laboratory. The laboratory's accreditation or any of its test reports in no way constitutes or implies product certification, approval, or endorsement by NVLAP or any agency of the U.S. Government.

Report Number: NGC 7009093

**Test Method:** This test method is in accordance with American Society for Testing and Materials Standard Test Method for Laboratory Measurement of Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine - Designation: E 492 – 04.  
The uncertainty limits of each tapping machine location met the precision requirements of section 11.3 of ASTM E 492-04.

**Specimen Description:** According to client: Laminate Flooring on DRAGONBOARD attached to 10 inch steel joist floor ceiling assembly, including 3-1/2 inch fiberglass insulation, RSIC-1™ isolation clips, hat channel and two layers of 5/8 inch Type C gypsum board ceiling.

The test specimen was a floor-ceiling assembly consisting of the following:

- 1 layer of 9.9mm (0.39 in.) laminate flooring. Samples were 197mm (7-3/4 in.) wide, by 1219mm (48 in.) long planks. Sample weight was 9.5 kg/m<sup>2</sup> (1.96 PSF).
- 1 layer of 2.16mm (0.085 in.) foam underlayment 0.78 kg/m<sup>2</sup> (0.16 PSF)
- 1 layer of 19mm (3/4 in.) thick DRAGONBOARD tongue and groove decking. Installed with smooth side up, screw attached 304.8mm (12 in.) o.c. field and 203.2mm (8 in.) o.c. perimeter with 41.3mm (1-5/8 in.) long self drilling steel screws. Sample weight was 16.4 kg/m<sup>2</sup> (3.36 PSF).
- 254mm (10 in.) SSJ 16 gauge metal C-Joists. The joists measured 3404mm wide x 254mm high x 41.3mm wide (134 in. x 10 in. x 1-5/8 in.). The sample weight was 2.5 lb. /lineal ft., 6.39 kg/m<sup>2</sup> (1.3 PSF).
- 257mm (10-1/8 in.) TR 16 gauge metal Rim Track. 257mm by 304.8mm (10-1/8 in. by 12 in.) 2.4 lb. /lineal ft., 1.95 kg/m<sup>2</sup> (0.4 PSF).
- 203mm (8 in.) AC Support Clips 16 gauge (angle clips). 38.1mm x 101.6mm x 203.2mm long (1-1/2 in. x 4 in. x 8 in. long), 3.81 kg/m<sup>2</sup> 0.78 lb. each, 0.5 kg/m<sup>2</sup> (0.1 PSF). Support clips were used to attach joists to rim with (3) 28.6mm (1-1/8 in.) self drilling screws per leg.
- 18 gauge metal cross bracing ran down the assembly centerline. The samples measured 651mm x 63.5mm (25-5/8 in. x 2-1/2 in.)
- 254mm (10 in.) SSJ 16 gauge metal solid joist blocking was used at each end and center cavities.
- 88.9mm (3-1/2 in.) fiberglass unfaced batt insulation was placed in the joist cavities above the resilient channel. Sample weight was 0.68 kg/m<sup>2</sup> (0.23 PSF).
- 1 layer of Pac International RSIC-1™ clips. The clips were attached to the bottom of the joists, 610mm (24 in.) o.c. along each joist and offset by 304.8mm (12 in.) between adjacent joists resulting in clips being 1219mm (48 in.) o.c. in a line perpendicular to the joists for hanging each hat channel spaced 304.8mm (12 in.) o.c. Installed with 41.3 mm (1-5/8 in.) #10 Tek screws. Sample weight was 0.21 kg/m<sup>2</sup> (0.04 PSF).
- 22mm (7/8 in.) 25 gauge (0.026 in.) metal hat channel, installed 609.6mm (12 in.) o.c. 0.27 kg/m (0.18 PLF) 0.51 kg/m<sup>2</sup> (0.10 PSF), attached perpendicular to joists.
- 2 layers of 15.9mm (5/8 in.) Type C gypsum board. Samples were 15.7mm (0.632 in.) thick and weighed 12.7 kg/m<sup>2</sup> (2.6 PSF). The base layer board was attached 609.6mm (24 in.) o.c. to channels, using 25.4mm (1 in.) Type S screws. The face layer board was attached 304.8mm (12 in.) o.c. with 41.3mm (1-5/8 in.) Type S screws. Board joints were taped.

The overall weight of the test assembly is 62.7 kg/m<sup>2</sup> (12.85 PSF).

The perimeter of the floor assembly was sealed with rubber gasketing and a sand filled trough. The test assembly is structurally isolated from the receiving room.

**Specimen size:** 3658mm x 4877mm (12 ft. x 16 ft.)

**Conditioning:** Test samples were submitted by client and tested as received.

**Test Results:** The results of the tests are given on pages 3 and 4.

The results reported above apply to specific samples submitted for measurement.

No responsibility is assumed for performance of any other specimen.

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Normalized impact sound pressure level						
Test: ASTM E 492 - 04 / ASTM E 989 - 06						
Test Report: NGC7009093						Page 3 of 4
Date: 9/17/2009						
Specimen Size [m <sup>2</sup> ]: 17.8						
<b>Source room</b>			<b>Receiving room</b>			
Rm Temp [°C]: 22			Volume [m <sup>3</sup> ]: 61.6			
Humidity [%]: 52			Rm Temp [°C]: 22			
			Humidity [%]: 52			
<b>Impact Insulation Class IIC [dB]: 48</b>						
Sum of Unfavorable Deviations [dB]: 10						
Max. Unfavorable Deviation [dB]: 8 at 100 Hz						
Frequency	L <sub>n</sub>	L2	d	Corr.	u.Dev.	ΔL <sub>n</sub>
[Hz]	[dB]	[dB]	[dB/s]	[dB]	[dB]	
100	72	31.3	2.20	40.7	8	1.78
125	62	40.4	3.01	21.6		1.60
160	66	34.1	3.44	31.9	2	1.44
200	63	27.4	3.47	35.6		0.68
250	63	25.3	3.13	37.7		0.34
315	61	29.5	2.87	31.5		0.37
400	60	37.1	2.68	22.9		0.33
500	56	36.6	2.35	19.4		0.16
630	51	35.3	2.15	15.7		0.14
800	45	27.6	2.16	17.4		0.18
1000	44	21.8	2.04	22.2		0.12
1250	38	21.1	1.89	16.9		0.12
1600	36	19.7	1.79	16.3		0.11
2000	36	17.7	1.62	18.3		0.13
2500	35	17.3	1.53	17.7		0.10
3150	33	16.9	1.43	16.1		0.18
4000	28	20.4	1.29	7.6		0.44
5000	23	19.4	1.15	3.6		1.03
L <sub>n</sub> = Normalized Sound Pressure Level, dB L2 = Receiving Room Level, dB d = Decay Time, dB/second ΔL <sub>n</sub> = Uncertainty for 95% Confidence Level						

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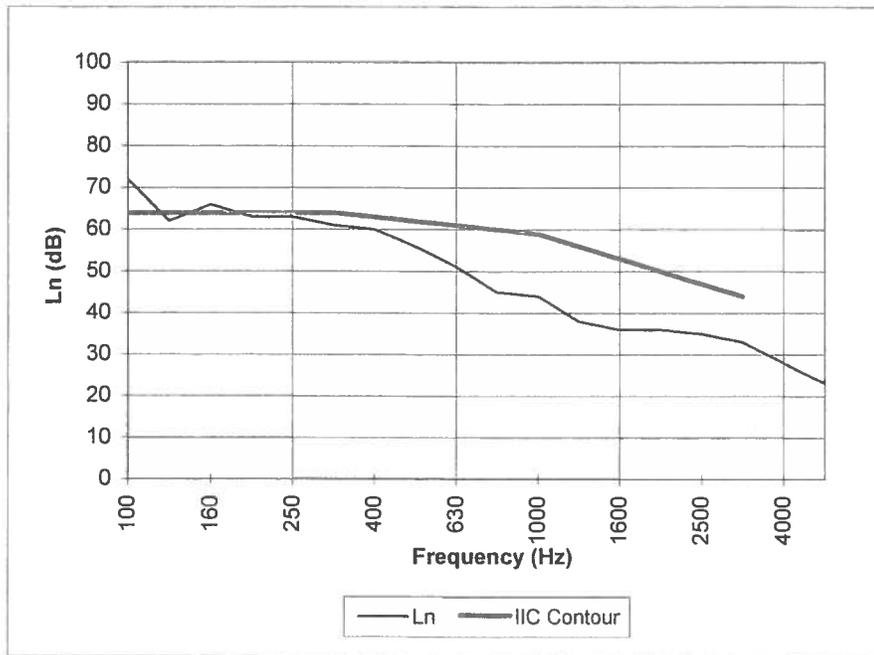
## Normalized impact sound pressure level

Test: ASTM E 492 - 04 / ASTM E 989 - 06

Test Report: NGC7009093  
 Test Date: 9/17/2009  
 Specimen Size [m<sup>2</sup>]: 17.8

**Impact Insulation Class IIC [dB]: 48**

Frequency [Hz]	L <sub>n</sub> [dB]
100	72
125	62
160	66
200	63
250	63
315	61
400	60
500	56
630	51
800	45
1000	44
1250	38
1600	36
2000	36
2500	35
3150	33
4000	28
5000	23



\* Due to high insulating value of specimen, background levels limit results at these frequencies.

L<sub>n</sub> = Normalized Sound Pressure Level, dB

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