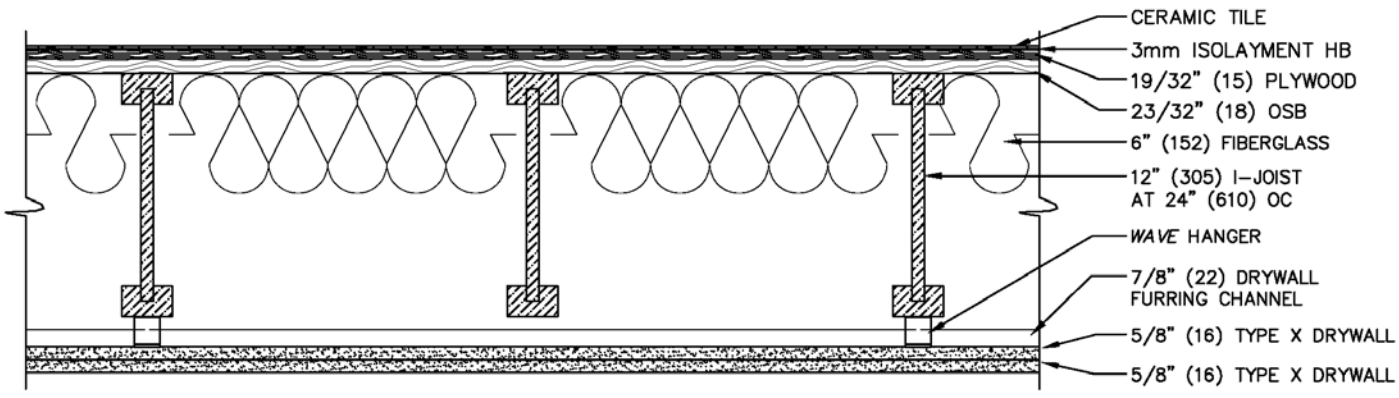
KINETICS NOISE CONTROL TEST REPORT #AT001092

- **KINETICS NOISE CONTROL PRODUCTS:**
  - *WAVE* HANGER
  - ISOLAYMENT 3MM HB

- **ACOUSTICAL RATINGS:**
  - STC 61
  - IIC 56

- **TESTING AGENCY & REPORT NUMBER:**
  - RIVERBANK ACOUSTICAL LABORATORIES
  - RAL TL09-377
  - RAL IN09-055



KINETICS DRAWING NUMBER: AT001092

KINETICS Noise Control

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Alion Science and Technology

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TEST REPORT

FOR: Kinetics Noise Control, Inc.
Dublin, OH

Sound Transmission Loss Test
RAL™-TL09-377

ON: Ceramic Tile on 3 mm Kinetics IsoLayment HB over 23/32 T&G Plywood on 11-7/8 Inch TJI iLevel 230 Joist at 24 Inches on Center with 6.25 Inch Fiberglass Batt Insulation, Kinetics WAVE Hangers, Double Layer 5/8 Inch Type X Gypsum Board

CONDUCTED: 21 December 2009

TEST METHOD

Unless otherwise designated, the measurements reported below were made with all facilities and procedures in explicit conformity with the ASTM Designations E90-04 and E413-04, as well as other pertinent standards. Riverbank Acoustical Laboratories has been accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) for this test procedure (NVLAP Lab Code: 100227-0). A description of the measuring technique is available separately.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the client as ceramic tile on 3 mm Kinetics IsoLayment HB over 23/32 T&G Plywood on 11-7/8 inch TJI iLevel 230 Joist at 24 inches on center with 6.25 inch fiberglass batt insulation, Kinetics WAVE Hangers, double layer 5/8 inch Type X gypsum board. The overall dimensions of the specimen as measured were nominally 4.27 m (168 in.) wide by 6.10 m (240 in.) high and 400 mm (15.75 in.) thick. The specimen was constructed directly in the laboratory's 4.27 m (14 ft) by 6.10 m (20 ft) test opening and was sealed on the periphery (both sides) with dense mastic.

The description of the specimen was as follows: From the top down, the floor consisted of ceramic tile floor over 3 mm IsoLayment HB underlayment with a HighBond fibrous bonding layer on 23/32" span rated OSB attached to nominal 12" TJI joist with a fiberglass insulated cavity, a double layer of 5/8" gypsum board ceiling attached using Kinetics WAVE Hangers and hat track. A more detailed description of the test assembly appears in the following sections.

Ceramic Tile Floor and Underlayment

The finished floor consisted of glazed ceramic tile. Each tile measured nominally 305 mm (12 in.) wide by 305 mm (12 in.) long by 7.6 mm (0.3 in.) thick. The tiles were applied to a ¼ x ¼ trowel bed of speed set fortified thinset mortar and were fully grouted. The total weight of the

ceramic tile floor with thinset and grout as calculated was 459 kg (1,013 lbs). The finished floor was allowed to cure a minimum of 7 days prior to testing. The tile floor was installed over Kinetics IsoLayment HB-3 mm, a bonded recycled rubber material with a HighBond fibrous bonding layer measuring 3 mm (0.12 in.) thick adhered to the subfloor assembly using a nominal 3 mm (0.125 in.) trowel application of urethane adhesive. Total weight of the underlayment was 54.2 kg (119.5 lbs).

Wood Subfloor and Support Assembly

The upper subfloor consisted of 15 mm (19/32 in.) BC plywood screwed using 51 mm (2 in.) long wood screws at 305 mm (12 in.) on center. The base floor consisted of 18 mm (23/32 in.) tongue and groove OSB board glued and nailed to iLevel TJI 230 Series Truss Joist and box sill using 63.5 mm (2.5 in.) long 8d nails at 203 mm (8 in.) on center at the perimeter and 305 mm (12 in.) on center in the field. The 302 mm (11.875 in.) deep TJI joists horizontally spanned the width of the test opening and were attached to the sill plate with 10d nails. The joists were spaced on 610 mm (24 in.) centers, starting 305 mm (12 in.) either side of the centerline. Total weight of the subfloor and support assembly was 771 kg (1,699 lbs).

Insulation

The cavities between the joists contained a layer of 159 mm (6.25 in.) thick by 610 mm (24 in.) wide unfaced fiberglass batt insulation. The fiberglass batts were stapled into the upper section of the cavity. The weight of the insulation was 34.5 kg (76 lbs).

Ceiling Assembly

The ceiling assembly consisted of 20 gauge roll-formed drywall furring channel (aka hat track) which measured 22 mm (0.875 in.) deep by 64 mm (2.5 in.) wide. Seven (7) full runs of drywall furring channels were mounted to Kinetics WAVE Acoustical Leaf Spring Ceiling Hangers, spaced at 610 mm (24 in.) by 1.22 m (48 in.) center to center. Runs of drywall furring channels extending the full length of the test specimen included splices which were overlapped 102 mm (4 in.) and double wire tied with 18 gauge tie wire as necessary. Total weight of the channels as measured was 20.2 kg (44.5 lbs).

The hat track was held in place by the Kinetics WAVE Hangers, each fastened to the joists with two (2), 10 x 1-1/2 in. Round Washer Recex Lo Root screws measuring 38 mm (1.5 in.) long.

The WAVE hangers were installed parallel to the joist to accommodate installation of the hat track perpendicular to the joists and spaced on 610 mm (24 in.) centers. For continuous run of hat track the WAVE 44 hangers were installed on the joists at 1.22 m (48 in.) centers. A total of 35 hangers were used in the field and four (4) WAVE 22 hangers were used in the corners only. Total weight of the hangers was 2.9 kg (6.5 lbs). A description of the acoustical leaf spring ceiling hanger is as follows: WAVE 44: A 32 mm (1.25 in.) wide by 216 mm (8.5 in.) long by 25 mm (1 in.) overall thick continuous formed hanger using 1.07 mm (0.042 in.) thick hardened spring steel. WAVE 22: A 32 mm (1.25 in.) wide by 216 mm (8.5 in.) long by 25 mm (1 in.) overall thick continuous formed hanger using 0.89 mm (0.035 in.) thick hardened spring steel.

The ceiling consisted of a double layer of 16 mm (0.625 in.) thick Type X gypsum board attached to the hat track. The base layer was attached with 25 mm (1 in.) Type S screws at 305 mm (12 in.) centers in the field and at 203 mm (8 in.) center at the butt joints. The face layer was attached with 41 mm (1.625 in.) Type S screws at 305 mm (12 in.) centers in the field and at 203 mm (8 in.) center at the butt joints. The total weight of the gypsum board was 502 kg (1,107 lbs). Joints were treated with paper tape embedded in all-purpose joint compound and screw heads were covered with compound. Total weight of the ceiling assembly with insulation was 584 kg (1,288 lbs). The perimeter of the completed test assembly was sealed with dense mastic.

The weight of the specimen as measured was 1,896 kg (4,180 lbs.), an average of 72.7 kg/m^2 (14.9 lbs/ft^2). The transmission area used in the calculations was 26 m^2 (280 ft^2). The source and receiving room temperatures at the time of the test were 23±1ºC (73±3ºF) and 49±2% relative humidity. The source and receive reverberation room volumes were 133 m^3 (4,713 ft^3) and 86 m^3 (3,032 ft^3), respectively.

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TEST REPORT

Kinetics Noise Control, Inc. RAL™-TL09-377

21 December 2009

TEST RESULTS

Sound transmission loss values are tabulated at the eighteen standard frequencies. A graphic presentation of the data and additional information appear on the following pages. The precision of the TL test data is within the limits set by the ASTM Standard E90-04.

FREQ.	T.L.	C.L.	DEF.	FREQ.	T.L.	C.L.	DEF.
100	40	0.82		800	62	0.29	1
125	45	0.80		1000	66	0.21	
160	45	0.65	3	1250	69	0.17	
200	46	0.77	5	1600	72	0.17	
250	49	0.74	5	2000	73	0.11	
315	52	0.54	5	2500	73	0.11	
400	55	0.61	5	3150	79	0.26	
500	58	0.36	3	4000	85	1.49	
630	61	0.31	1	5000	85	3.13	

STC=61

ABBREVIATION INDEX

FREQ. = FREQUENCY, HERTZ, (cps)
T.L. = TRANSMISSION LOSS, dB
C.L. = UNCERTAINTY IN dB, FOR A 95% CONFIDENCE LIMIT
DEF. = DEFICIENCIES, dB<STC CONTOUR (SUM OF DEF = 28)
STC = SOUND TRANSMISSION CLASS

Tested by _____ Approved by _____

Dean Victor
Senior Experimentalist

David L. Moyer
Laboratory Manager

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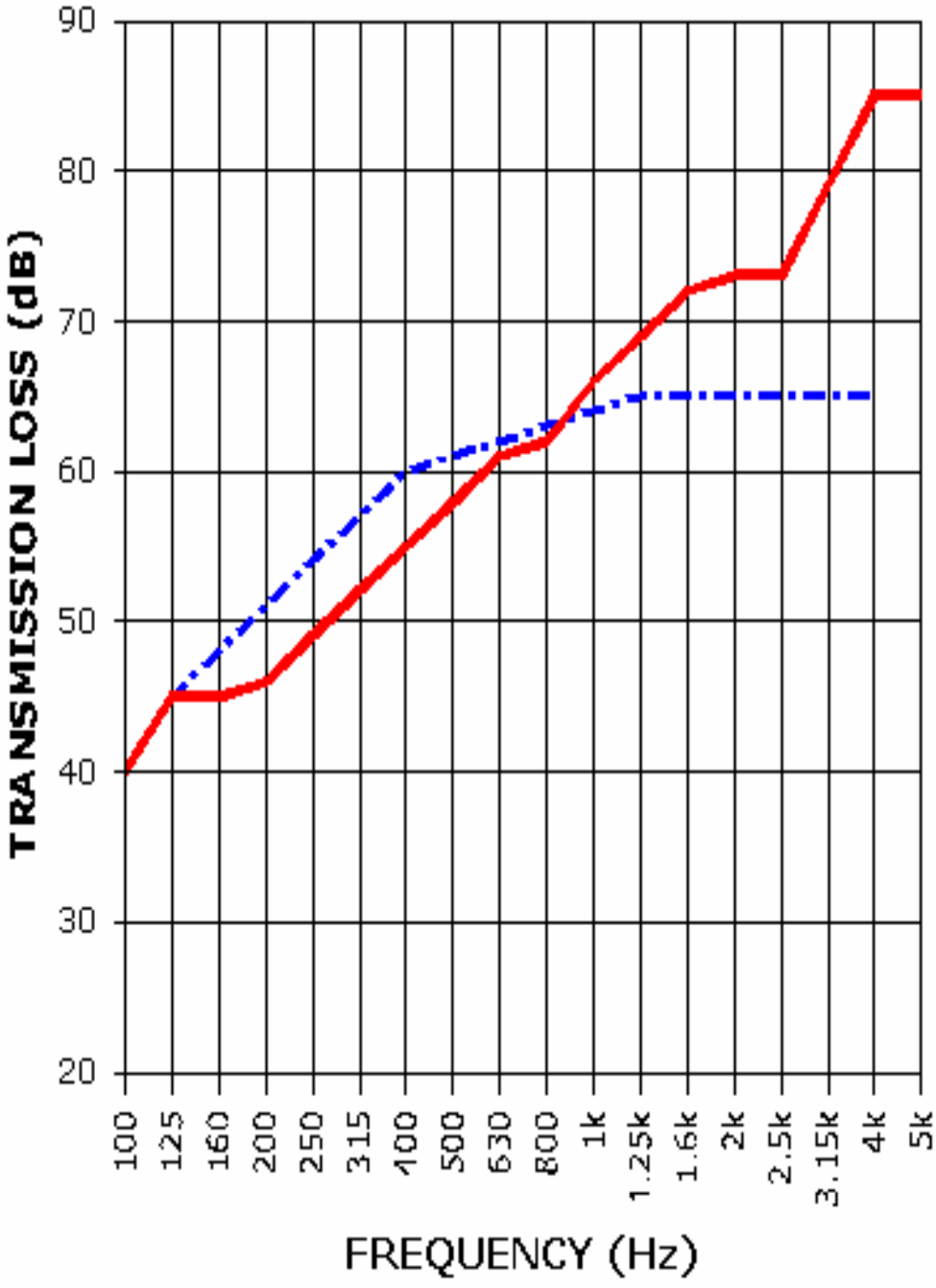
TEST REPORT

SOUND TRANSMISSION REPORT
RAL - TL09-377



STC= 61

TRANSMISSION LOSS
SOUND TRANSMISSION LOSS CONTOUR

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TEST REPORT

Appendix to ASTM E90 Sound Transmission Loss Test

Kinetics Noise Control, Inc. RAL™-TL09-377

Additional Frequency Data for Transmission Loss Testing

As requested by the client, transmission loss (TL) values were calculated at additional test frequencies. Although the measurements were made in accordance with the procedures described in ASTM E90-04, they do not qualify as part of the standard. Since the results are representative of the test environment only, they are unofficial and intended for research and development guidelines rather than for commercial purposes. The transmission loss values at the additional frequencies were as follows:

	RAL™-TL09-377
1/3 Octave Center Frequency (Hz)	Sound Transmission Loss (dB)
50	34
63	41
80	38

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TEST REPORT

FOR: Kinetics Noise Control, Inc.
Dublin, OH

Impact Sound Transmission Test
RAL™-IN09-055

ON: Ceramic Tile on 3 mm Kinetics IsoLayment HB over 23/32 T&G Plywood on 11-7/8 Inch TJI iLevel 230 Joist at 24 Inches on Center with 6.25 Inch Fiberglass Batt Insulation, Kinetics WAVE Hangers, Double Layer 5/8 Inch Type X Gypsum Board

CONDUCTED: 21 December 2009

TEST METHOD

The measurements reported below were made with all facilities and procedures in explicit conformity with the ASTM Designations E492-04 and E989-06, as well as other pertinent standards. Riverbank Acoustical Laboratories has been accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) for this test procedure (NVLAP Lab Code: 100227-0). A description of the measuring technique is available separately.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the client as ceramic tile on 3 mm Kinetics IsoLayment HB over 23/32 T&G Plywood on 11-7/8 inch TJI iLevel 230 Joist at 24 inches on center with 6.25 inch fiberglass batt insulation, Kinetics WAVE Hangers, double layer 5/8 inch Type X gypsum board. The overall dimensions of the specimen as measured were nominally 4.27 m (168 in.) wide by 6.10 m (240 in.) high and 400 mm (15.75 in.) thick. The specimen was constructed directly in the laboratory's 4.27 m (14 ft) by 6.10 m (20 ft) test opening and was sealed on the periphery (both sides) with dense mastic.

The description of the specimen was as follows: From the top down, the floor consisted of ceramic tile floor over 3 mm IsoLayment HB underlayment with a HighBond fibrous bonding layer on 23/32" span rated OSB attached to nominal 12" TJI joist with a fiberglass insulated cavity, a double layer of 5/8" gypsum board ceiling attached using Kinetics WAVE Hangers and hat track. A more detailed description of the test assembly appears in the following sections.

Ceramic Tile Floor and Underlayment

The finished floor consisted of glazed ceramic tile. Each tile measured nominally 305 mm (12 in.) wide by 305 mm (12 in.) long by 7.6 mm (0.3 in.) thick. The tiles were applied to a ¼ x ¼ trowel bed of speed set fortified thinset mortar and were fully grouted. The total weight of the ceramic tile floor with thinset and grout as calculated was 459 kg (1,013 lbs). The typical 28 day

aging for the ceramic tile installation was waived based on previous testing performed per E492-04 Section 7.2.2, that showed no significant difference in the results after 14 days of aging. The tile floor was installed over Kinetics IsoLayment HB-3 mm, a bonded recycled rubber material with a HighBond fibrous bonding layer measuring 3 mm (0.12 in.) thick adhered to the subfloor assembly using a nominal 3 mm (0.125 in.) trowel application of urethane adhesive. Total weight of the underlayment was 54.2 kg (119.5 lbs).

Wood Subfloor and Support Assembly

The upper subfloor consisted of 15 mm (19/32 in.) BC plywood screwed using 51 mm (2 in.) long wood screws at 305 mm (12 in.) on center. The base floor consisted of 18 mm (23/32 in.) tongue and groove OSB board glued and nailed to iLevel TJI 230 Series Truss Joist and box sill using 63.5 mm (2.5 in.) long 8d nails at 203 mm (8 in.) on center at the perimeter and 305 mm (12 in.) on center in the field. The 302 mm (11.875 in.) deep TJI joists horizontally spanned the width of the test opening and were attached to the sill plate with 10d nails. The joists were spaced on 610 mm (24 in.) centers, starting 305 mm (12 in.) either side of the centerline. Total weight of the subfloor and support assembly was 771 kg (1,699 lbs).

Insulation

The cavities between the joists contained a layer of 159 mm (6.25 in.) thick by 610 mm (24 in.) wide unfaced fiberglass batt insulation. The fiberglass batts were stapled into the upper section of the cavity. The weight of the insulation was 34.5 kg (76 lbs).

Ceiling Assembly

The ceiling assembly consisted of 20 gauge roll-formed drywall furring channel (aka hat track) which measured 22 mm (0.875 in.) deep by 64 mm (2.5 in.) wide. Seven (7) full runs of drywall furring channels were mounted to Kinetics WAVE Acoustical Leaf Spring Ceiling Hangers, spaced at 610 mm (24 in.) by 1.22 m (48 in.) center to center. Runs of drywall furring channels extending the full length of the test specimen included splices which were overlapped 102 mm (4 in.) and double wire tied with 18 gauge tie wire as necessary. Total weight of the channels as measured was 20.2 kg (44.5 lbs).

The hat track was held in place by the Kinetics WAVE Hangers, each fastened to the joists with two (2), 10 x 1-1/2 in. Round Washer Recex Lo Root screws measuring 38 mm (1.5 in.) long.

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The ceiling consisted of a double layer of 16 mm (0.625 in.) thick Type X gypsum board attached to the hat track. The base layer was attached with 25 mm (1 in.) Type S screws at 305 mm (12 in.) centers in the field and at 203 mm (8 in.) center at the butt joints. The face layer was attached with 41 mm (1.625 in.) Type S screws at 305 mm (12 in.) centers in the field and at 203 mm (8 in.) center at the butt joints. The total weight of the gypsum board was 502 kg (1,107 lbs). Joints were treated with paper tape embedded in all-purpose joint compound and screw heads were covered with compound. Total weight of the ceiling assembly with insulation was 584 kg (1,288 lbs). The perimeter of the completed test assembly was sealed with dense mastic.

The weight of the specimen as measured was 1,896 kg (4,180 lbs.), an average of 72.7 kg/m^2 (14.9 lbs/ft^2). The area of the specimen was 26 m^2 (280 ft^2). The source and receiving room temperatures at the time of the test were 22±2ºC (72±2ºF) and 51±2% relative humidity. The source and receive reverberation room volumes were 133 m^3 (4,713 ft^3) and 86 m^3 (3,032 ft^3), respectively.

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TEST REPORT

Kinetics Noise Control, Inc. RAL™-IN09-055

21 December 2009

TEST RESULTS

Sound pressure levels at 1/3 octave intervals, normalized to 10 square meters, are given in tabular form. The impact insulation class, IIC, was computed in accordance with ASTM E989-06 and ASTM E492-04.

FREQ.	Ln	C.L.	DEV	FREQ.	Ln	C.L.	DEV
100	62	1.45	6	800	56	0.27	4
125	54	0.89		1000	54	0.35	3
160	55	0.76		1250	49	0.58	1
200	54	0.85		1600	45	0.46	
250	57	0.59	1	2000	45	0.31	3
315	57	0.54	1	2500	45	0.40	6
400	56	0.52	1	3150	38	0.37	2
500	55	0.40	1	4000	32	0.57	
630	56	0.32	3	5000	27	1.17	

IIC=56

ABBREVIATION INDEX

FREQ. = FREQUENCY, HERTZ, (cps)
Ln = NORMALIZED IMPACT SOUND PRESSURE LEVEL, dB
C.L. = UNCERTAINTY IN dB, FOR A 95% CONFIDENCE LIMIT
DEV. = DEVIATION, dB > IIC CONTOUR (SUM OF DEV = 32)
IIC = IMPACT INSULATION CLASS
* = INDICATES A CORRECTION HAS BEEN APPLIED TO DATA DUE TO BACKGROUND NOISE LEVELS

Tested by _____ Approved by _____

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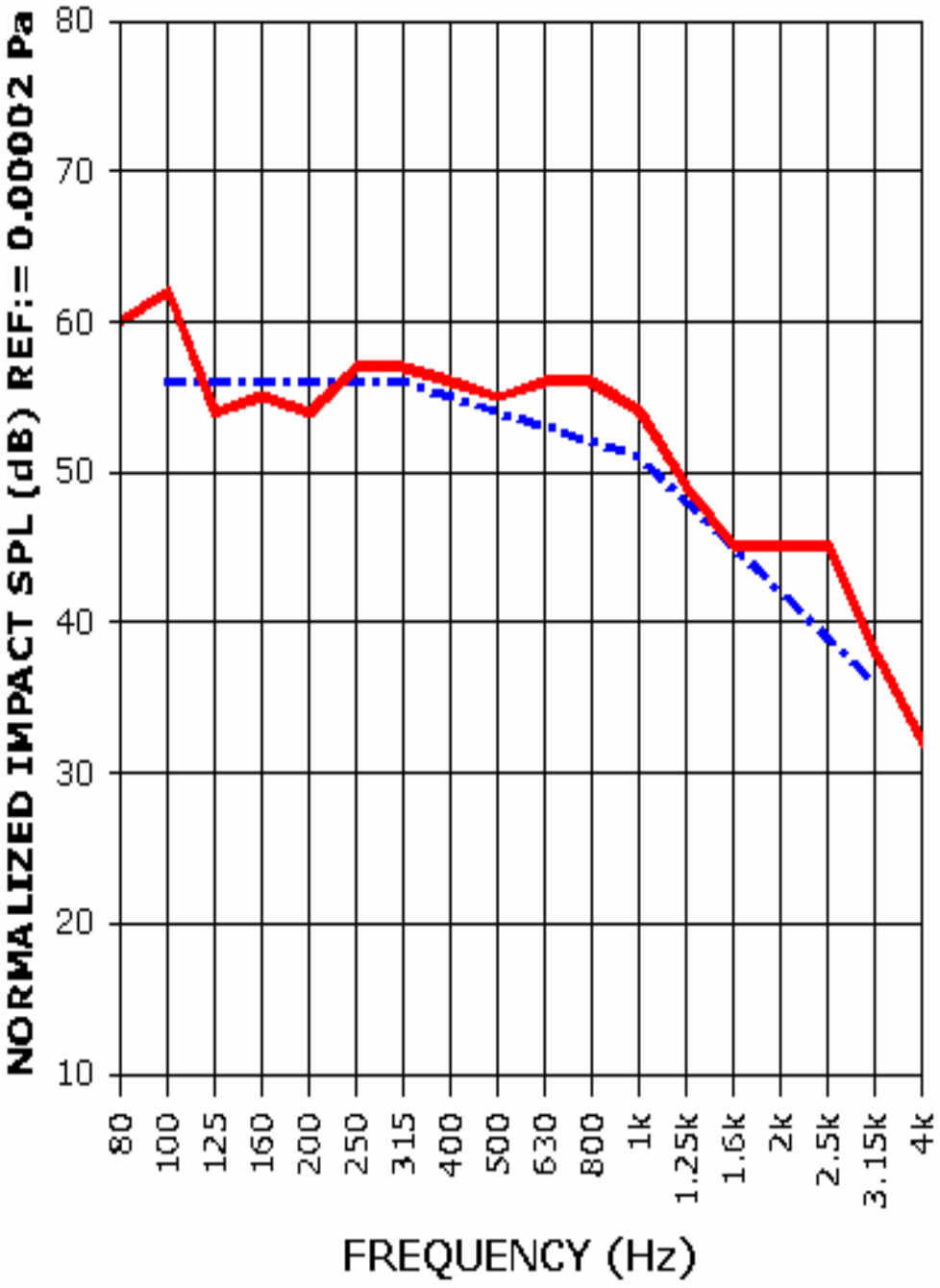
TEST REPORT

IMPACT SOUND TRANSMISSION REPORT
RAL - IN09-055



IIC= 56

IMPACT SOUND PRESSURE LEVEL
IMPACT INSULATION CLASS CONTOUR

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TEST REPORT

Appendix to ASTM E492 Impact Sound Transmission Test

Kinetics Noise Control, Inc. RAL™-IN09-055

Additional Frequency Data for Impact Sound Testing

As requested by the client, normalized impact sound Pressure levels (Ln) values were calculated at additional test frequencies. Although the measurements were made in accordance with the procedures described in ASTM E492-04, they do not qualify as part of the standard. Since the results are representative of the test environment only, they are unofficial and intended for research and development guidelines rather than for commercial purposes. The normalized impact sound pressure level values at the additional frequencies were as follows:

	RAL-IN09-055
1/3 Octave Center Frequency (Hz)	Normalized Impact Sound Pressure Level (dB)
50	60
63	58
80	60