RSIC ACOUSTIC ASSEMBLY

FLOOR CEILING ASSEMBLY

DIRECT FIX TO SOLID WOOD JOIST

Toll Free (866) 774-2100
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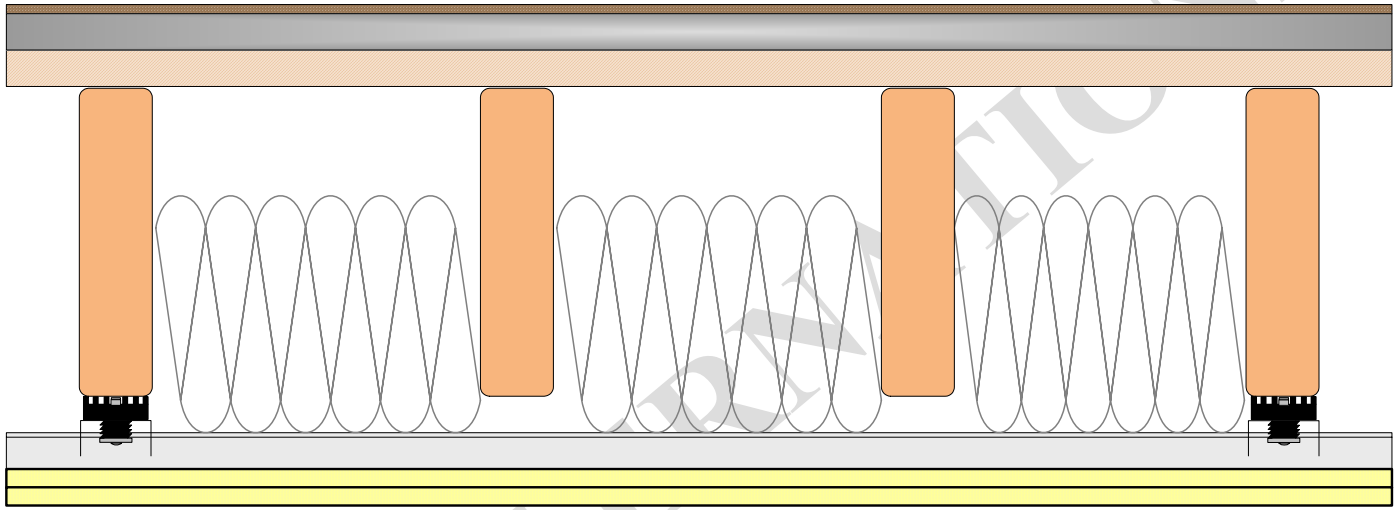
FCWT RAL IN09-012



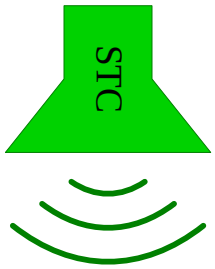
CONSTRUCTION

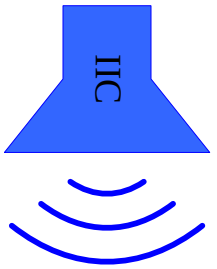
- 3/8" HARDWOOD FLOORING
- VAPOR BARRIER
- 3/4” LT WT CONCRETE
- 5/8” PLYWOOD SUBFLOOR
- 2" X 10" SOLID WOOD JOIST @ 16" OC
- R-19 FIBERGLASS BATT INSULATION (NOM 6")
- RSIC-1 INSTALLED @ 48" OC
- 7/8" DRYWALL FURRING CHANNEL @ 24" OC
- 2 LAYERS 5/8" FIRE CODE GYPSUM BOARD

CLASSIFIED c UL us

Fire Resistance Ratings

Designs:
L502, L514, L516, L523, L532, L569, L590, L593





RIVERBANK ACOUSTICAL LABORATORIES (RAL)

RAL TL09-042
STC 55

RAL IN09-012
IIC 54

RIVERBANK ACOUSTICAL LABORATORIES

1512 S. BATAVIA AVENUE
GENEVA, ILLINOIS 60134

Alion Science and Technology

630/232-0104
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TEST REPORT

FOR: PAC International, Inc.
7340 Smoke Ranch Rd., Suite A, Las Vegas, NV
89128-0261

Impact Sound Transmission Test
RAL™-IN09-012

ON: Test #2C – Laminate Hardwood Flooring - RSIC-1 with Two (2) Layers Gypsum Board with Lightweight Gypsum Concrete

CONDUCTED: 27 February 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 Test #2C – Laminate Hardwood Flooring - RSIC-1 with two (2) layers gypsum board with lightweight gypsum concrete. The overall dimensions of the finished floor system were nominally 1.52 m (60 in.) wide by 1.52 m (60 in.) long. The overall dimensions of the substrate and ceiling system were nominally 4.27 m (14 ft) by 6.10 m (20 ft). The thickness of the finished floor system and substrate and ceiling system was 350 mm (13.8 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 laminate flooring over 19 mm (0.75 in.) thick lightweight gypsum concrete over 19/32" span rated OSB board attached to 232 mm (9.125 in.) deep solid joist with a fiberglass insulated cavity, a double layer of 5/8" Firecode "C" gypsum board ceiling attached using Resilient Sound Isolation Clips (RSIC-1) and hat track. A more detailed description of the test assembly appears in the following sections.

Prefinished Laminate Floor and Underlayment

The finished floor consisted of 9.5 mm (0.375 in.) thick prefinished laminate flooring (plywood core) provided as nominal 108 mm (4.25 in.) wide by various lengths up to 1.2 m (47.25 in.) long

planks with tongue and groove edging. Weight of the wood floor was 15.4 kg (34 lbs). Prior to installing the finished floor, an underlayment of 2 mm (0.075 in.) thick polyurethane foam was loose laid on the floor with all joints taped. Total weight of the underlayment as measured was 1.6 kg (3.5 lbs).

Lightweight Gypsum Concrete

The gypsum concrete was poured directly onto the plywood subfloor and allowed to cure in excess of 28 days. The gypsum concrete measured a nominal 19 mm (0.75 in.) thick and had an average density of 1,930 kg/m³ (120.5 pcf) calculated from poured samples. The total weight of the gypsum concrete floor as calculated was 956 kg (2,109 lbs).

Wood Subfloor and Support Assembly

The base floor consisted of 15 mm (19/32 in.) tongue and groove OSB board glued and nailed to two-by-ten (2 x 10) solid wood floor joists and box sill using 76 mm (3 in.) long 10d nails at 152 mm (6 in.) on center at the perimeter and 254 mm (10 in.) on 203 mm (8 in.) centers. The two-by-ten (2 x 10) solid wood joists horizontally spanned the width of the test opening and were attached to the sill plate with 10d nails. The joists were spaced on 406 mm (16 in.) centers, starting 203 mm (8 in.) either side of the centerline. Total weight of the subfloor and support assembly was 645 kg (1,421.25 lbs).

Insulation

The cavities between the joists contained a layer of 159 mm (6.25 in.) thick by 381 mm (15 in.) wide unfaced fiberglass batt insulation. The weight of the insulation was 28.1 kg (62 lbs).

Ceiling Assembly

The ceiling assembly consisted of 25 gauge roll-formed drywall furring channel (aka hat track) which measured 22 mm (0.875 in.) deep by 65 mm (2.56 in.) wide. Eight (8) full runs of drywall furring channel were mounted to the RSIC-1 clips, spaced at 24 in. by 48 in. center to center. Runs of drywall furring channels extending the full length of the test specimen included splices which were overlapped 152 mm (6 in.) and double wire tied with 18 gauge tie wire as necessary. Four runs of track 1.52 m (60 in.) long and four at 1.22 m (48 in.) long were installed parallel to the main runs as necessary to provide for independent suspension of each gypsum board at the

butt joints. Total weight of the channels as measured was 22.2 kg (49 lbs). The hat track was attached to the PAC International's Resilient Sound Isolation Clips (RSIC-1), each fastened to the joists with a 63 mm (2.5 in.) long #8 coarse thread drywall screw. The RSIC-1 clips were installed to accommodate installation of the hat track perpendicular to the solid wood joists and spaced on 610 mm (24 in.) centers. For continuous run of hat track the RSIC-1 clips were installed on the joist on 1.22 m (48 in.) centers. For short independent sections of hat track the RSIC-1 clips were installed near each end. A total of 73 clips were used and weighed 4.6 kg (10.5 lbs). The ceiling consisted of a base layer of 16 mm (0.625 in.) thick, USG Firecode "C" gypsum board attached to the hat track 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 and a face base layer of 16 mm (0.625 in.) thick, USG Firecode "C" gypsum board 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 566 kg (1,249 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 660 kg (1,454 lbs). The perimeter of the completed test assembly was sealed with dense mastic.

The weight of the entire specimen as calculated was 2,250 kg (4,960 lbs.), an average of 86.4 kg/m^2 (17.7 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 24±1ºC (75±1ºF) and 52±1% relative humidity. The source and receive reverberation room volumes were 136 m^3 (4,789 ft^3) and 86 m^3 (3,038 ft^3), respectively.

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GENEVA, ILLINOIS 60134

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TEST REPORT

PAC International, Inc. RAL™-IN09-012

27 February 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 E989-89 and ASTM E492-04.

FREQ.	Ln	C.L.	DEV	FREQ.	Ln	C.L.	DEV
100	66	0.58	8	800	52	0.30	
125	61	0.68	3	1000	48	0.30	
160	61	0.57	3	1250	41	0.19	
200	61	0.70	3	1600	36	0.19	
250	60	0.48	2	2000	35	0.21	
315	59	0.49	1	2500	33	0.22	
400	61	0.36	4	3150	27	0.33	
500	60	0.44	4	4000	16*	0.35	
630	57	0.34	2	5000	9***	1.11	

IIC=54

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 = 30)
IIC = IMPACT INSULATION CLASS
* = CORRECTION APPLIED FOR BACKGROUND NOISE LEVEL
*** = INDICATES LOWER LIMIT DUE TO BACKGROUND CORRECTION

Tested by _____ Approved by _____

Marc Sciaky
Experimentalist

David L. Moyer
Laboratory Manager

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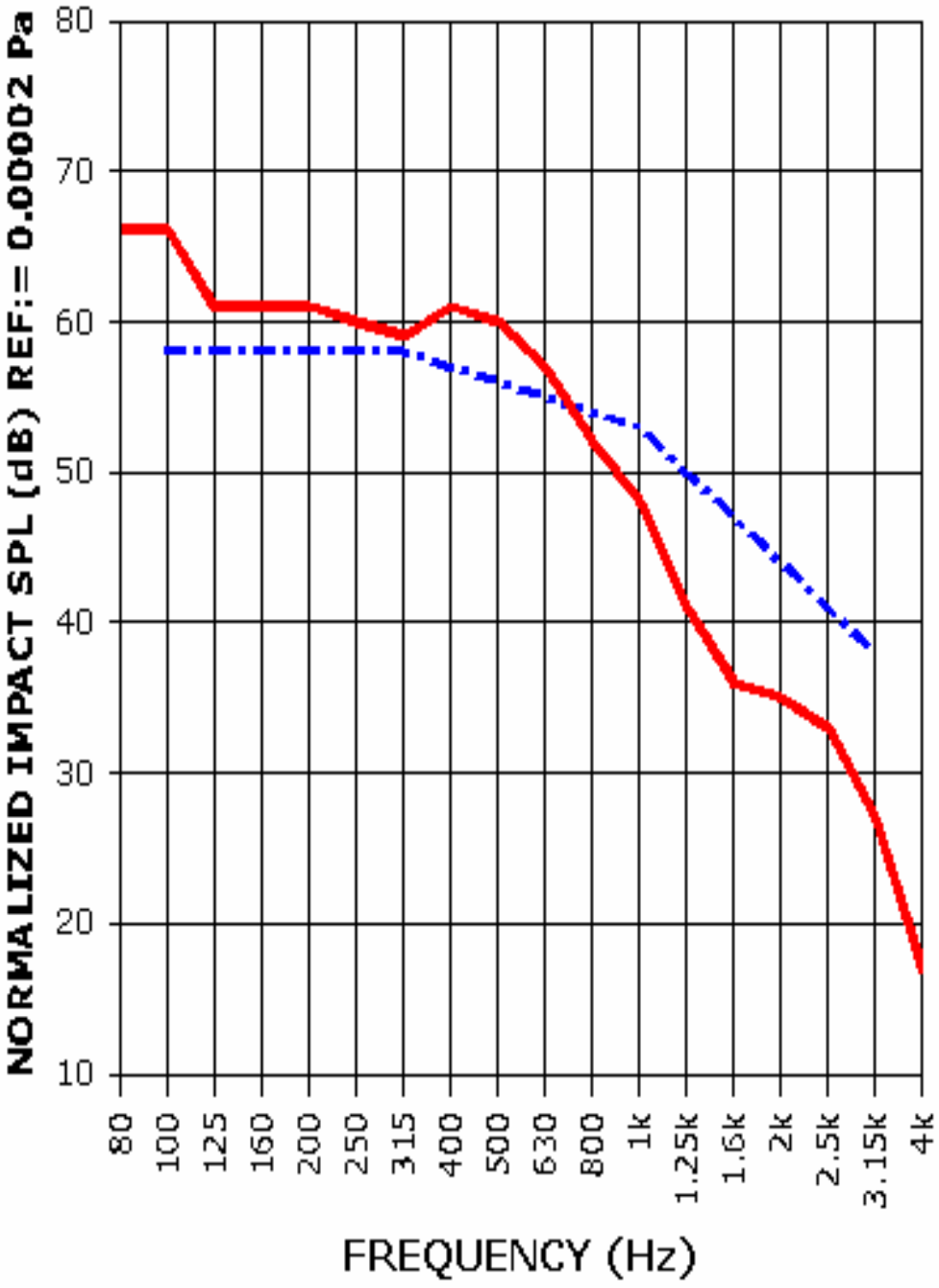
TEST REPORT

IMPACT SOUND TRANSMISSION REPORT
RAL - IN09-012



IIC= 54

IMPACT SOUND PRESSURE LEVEL
IMPACT INSULATION CLASS CONTOUR

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GENEVA, ILLINOIS 60134

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TEST REPORT

FOR: PAC International, Inc.
7340 Smoke Ranch Rd., Suite A, Las Vegas, NV
89128-0261

Sound Transmission Loss Test
RAL™-TL09-042

ON: Test #2A – Sheet Vinyl - RSIC-1 Two (2) Layers
Gypsum Board with Lightweight Gypsum Concrete

CONDUCTED: 27 February 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 Test #2A – Sheet Vinyl - RSIC-1 with two (2) layers gypsum board with lightweight gypsum concrete. The overall dimensions of the specimen as measured were nominally 4.27 m (168 in.) wide by 6.10 m (240 in.) high and 343 mm (13.5 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 sheet vinyl over 19 mm (0.75 in.) thick lightweight gypsum concrete over 19/32" span rated OSB board attached to 232 mm (9.125 in.) deep solid joist with a fiberglass insulated cavity, a double layer of 5/8" Firecode "C" gypsum board ceiling attached using Resilient Sound Isolation Clips (RSIC-1) and hat track. A more detailed description of the test assembly appears in the following sections.

Vinyl Floor

The floor covering sheet vinyl measured 3 mm (0.12 in.) thick. Total weight of the vinyl was 47.4 kg (104.5 lbs).

Lightweight Gypsum Concrete

The gypsum concrete was poured directly onto plywood subfloor allowed to cure in excess of 28

days. The gypsum concrete measured a nominal 19 mm (0.75 in.) thick and had an average density of 1,930 kg/m³ (120.5 pcf) calculated from poured samples. The total weight of the gypsum concrete floor as calculated was 956 kg (2,109 lbs).

Wood Subfloor and Support Assembly

The base floor consisted of 15 mm (19/32 in.) tongue and groove OSB board glued and nailed to two-by-ten (2 x 10) solid wood floor joists and box sill using 76 mm (3 in.) long 10d nails at 152 mm (6 in.) on center at the perimeter and 254 mm (10 in.) on 203 mm (8 in.) centers. The two-by-ten (2 x 10) solid wood joists horizontally spanned the width of the test opening and were attached to the sill plate with 10d nails. The joists were spaced on 406 mm (16 in.) centers, starting 203 mm (8 in.) either side of the centerline. Total weight of the subfloor and support assembly was 645 kg (1,421.25 lbs).

Insulation

The cavities between the joists contained a layer of 159 mm (6.25 in.) thick by 381 mm (15 in.) wide unfaced fiberglass batt insulation. The weight of the insulation was 28.1 kg (62 lbs).

Ceiling Assembly

The ceiling assembly consisted of 25 gauge roll-formed drywall furring channel (aka hat track) which measured 22 mm (0.875 in.) deep by 65 mm (2.56 in.) wide. Eight (8) full runs of drywall furring channel were mounted to the RSIC-1 clips, spaced at 24 in. by 48 in. center to center. Runs of drywall furring channels extending the full length of the test specimen included splices which were overlapped 152 mm (6 in.) and double wire tied with 18 gauge tie wire as necessary. Four runs of track 1.52 m (60 in.) long and four at 1.22 m (48 in.) long were installed parallel to the main runs as necessary to provide for independent suspension of each gypsum board at the butt joints. Total weight of the channels as measured was 22.2 kg (49 lbs). The hat track was attached to the PAC International's Resilient Sound Isolation Clips (RSIC-1), each fastened to the joists with a 63 mm (2.5 in.) long #8 coarse thread drywall screw. The RSIC-1 clips were installed to accommodate installation of the hat track perpendicular to the solid wood joists and spaced on 610 mm (24 in.) centers. For continuous run of hat track the RSIC-1 clips were installed on the joist on 1.22 m (48 in.) centers. For short independent sections of hat track the RSIC-1 clips were installed near each end. A total of 73 clips were used and weighed 4.6 kg (10.5 lbs). The ceiling consisted of a base layer of 16 mm (0.625 in.) thick, USG Firecode "C"

gypsum board attached to the hat track 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 and a face base layer of 16 mm (0.625 in.) thick, USG Firecode "C" gypsum board 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 566 kg (1,249 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 660 kg (1,454 lbs). The perimeter of the completed test assembly was sealed with dense mastic.

The weight of the entire specimen as calculated was 2,280 kg (5,027 lbs.), an average of 87.9 kg/m2 (18 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 23ºC (74ºF) and 52±1% relative humidity. The source and receive reverberation room volumes were 136 m3 (4,789 ft3) and 86 m3 (3,038 ft3), respectively.

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TEST REPORT

PAC International, Inc. RAL™-TL09-042

27 February 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	34	0.54		800	52	0.24	5
125	41	0.80		1000	54	0.12	4
160	38	0.60	4	1250	61	0.16	
200	42	0.54	3	1600	65	0.17	
250	45	0.42	3	2000	65	0.11	
315	49	0.51	2	2500	67	0.12	
400	51	0.40	3	3150	75	0.15	
500	53	0.29	2	4000	85	0.11	
630	53	0.37	3	5000	88	0.22	

STC=55

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 = 29)
STC = SOUND TRANSMISSION CLASS

Tested by _____ Approved by _____

Marc Sciaky
Experimentalist

David L. Moyer
Laboratory Manager

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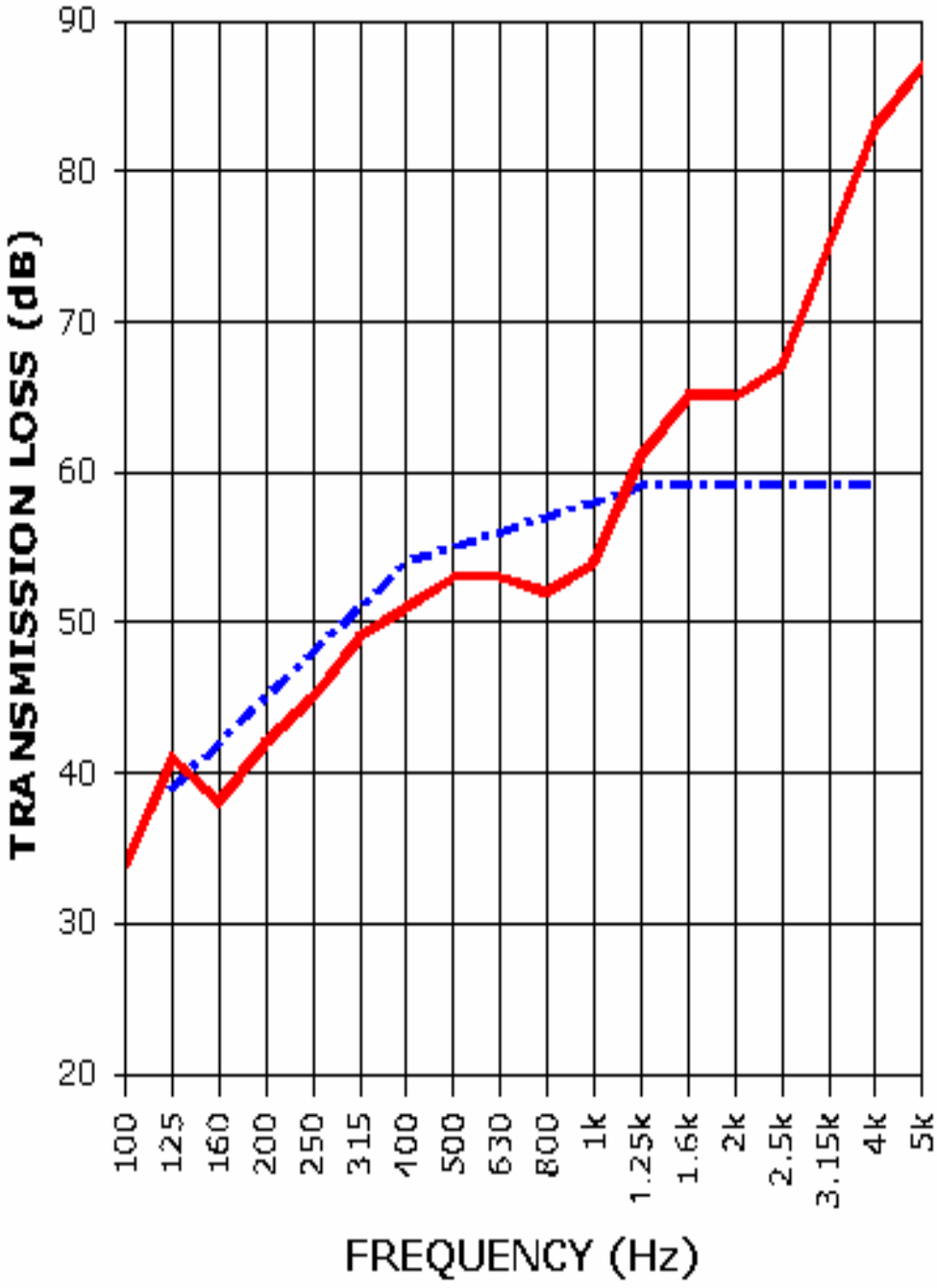
TEST REPORT

SOUND TRANSMISSION REPORT
RAL - TL09-042



STC= 55

TRANSMISSION LOSS
SOUND TRANSMISSION LOSS CONTOUR