

Order No. 3039179

March 6, 2003

REPORT NO. 3039179-004

**IMPACT SOUND TRANSMISSION TEST
AND CLASSIFICATION OF 3/8 INCH THICK ENGINEERED HARDWOOD FLOORING
OVER PROTECTO WRAP'S WHISPER MAT HW UNDERLAYMENT
ON A FLOOR/CEILING ASSEMBLY**

RENDERED TO

**TORAY PLASTICS (AMERICA), INC.
500 TORAY DRIVE
FRONT ROYAL, VA 22630**

INTRODUCTION

This report gives the results of an Impact Sound Transmission test on engineered hardwood flooring over underlayment. The hardwood and underlayment were selected and supplied by the client and received at the laboratories on February 18 and 24, 2003. The samples appeared to be in new, unused condition upon arrival.

AUTHORIZATION

Purchase Order No. IN/07081 from Toray Plastics (America), Inc.

TEST METHOD

The specimen was tested in accordance with the American Society for Testing and Materials designations ASTM E492-96, "Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine". It was classified in accordance with ASTM E989-89 (Re-approved 1999), entitled, "Standard Classification for Determination of Impact Insulation Class (IIC)".

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GENERAL

The method is designed to measure the impact sound transmission performance of a floor-ceiling assembly, in a controlled laboratory environment. A standard tapping machine (B & K Type 3204) was placed at four positions on a test floor that forms the horizontal separation between two rooms, one directly above the other. The data obtained was normalized to a reference room absorption of 10 square meters in accordance with the test method.

The standard also prescribes a single-figure classification rating called "Impact Insulation Class, IIC" which can be used by architects, builders and code authorities for acoustical design purposes in building construction.

The IIC is obtained by matching a standard reference contour to the plotted normalized one-third octave band sound pressure levels at each test frequency. The greater the IIC rating, the lower the impact sound transmission through the floor-ceiling assembly.

DESCRIPTION OF THE FLOOR/CEILING ASSEMBLY

The test floor is a 100 sq. ft. opening that forms the horizontal separation of the two rooms, one directly above the other. The structural members are open webbed wood floor trusses, 16 inches deep installed 24 inches on center. The sub flooring is 5/8 inch thick tongue and groove plywood. The bridging is a continuous 2 x 4 nailed to the bottom chord and the sides of the diagonals with 2 inch long nails. Single leaf RC-1 resilient channels (2 1/2 inch x 1/2 inch) were spaced 16 inches on center and attached to the bottom chord by screws. The insulation is 5 1/2 inches cellulose with a density of 1.6 pcf. The ceiling is gypsum board, 5/8 inches thick, with the long edges located between the joists perpendicular to the resilient channels. Short edges are staggered by 4 ft. Sheets are fastened to the resilient channels by means of 1 1/2 inch screws located 1/2 inch away from the edge and 3 inches from the long edges; screws are spaced 6 inches on center. Joints are taped and finished with two layers of compound.

The topping over the tongue and groove plywood sub-floor is 1 1/2 inches of Gyp-Crete.

DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of 3/8 inch thick by 3 inch wide tongue and groove Harris-Tarkett Engineered Hardwood Flooring (Maple Coffee) loose layed over Protecto Wrap's Whisper Mat HW Underlayment. The underlayment contained a rubberized adhesive on the bottom. The protective paper covering was not removed from the underlayment adhesive for the test. No adhesive was used between the flooring and the underlayment.

RESULTS OF TEST

The data obtained in the room below the panel normalized to $A_o = 10$ square meters, is as follows:

<u>1/3 Octave Band Center Frequency Hz</u>	<u>1/3 Octave Band Sound Pressure Level dB re 0.0002 Microbar</u>
100	66
125	66
160	61
200	62
250	61
315	59
400	59
500	54
630	47
800	39
1000	35
1250	32
1600	29
2000	29
2500	28
3150	25
Impact Insulation Class (IIC)	54

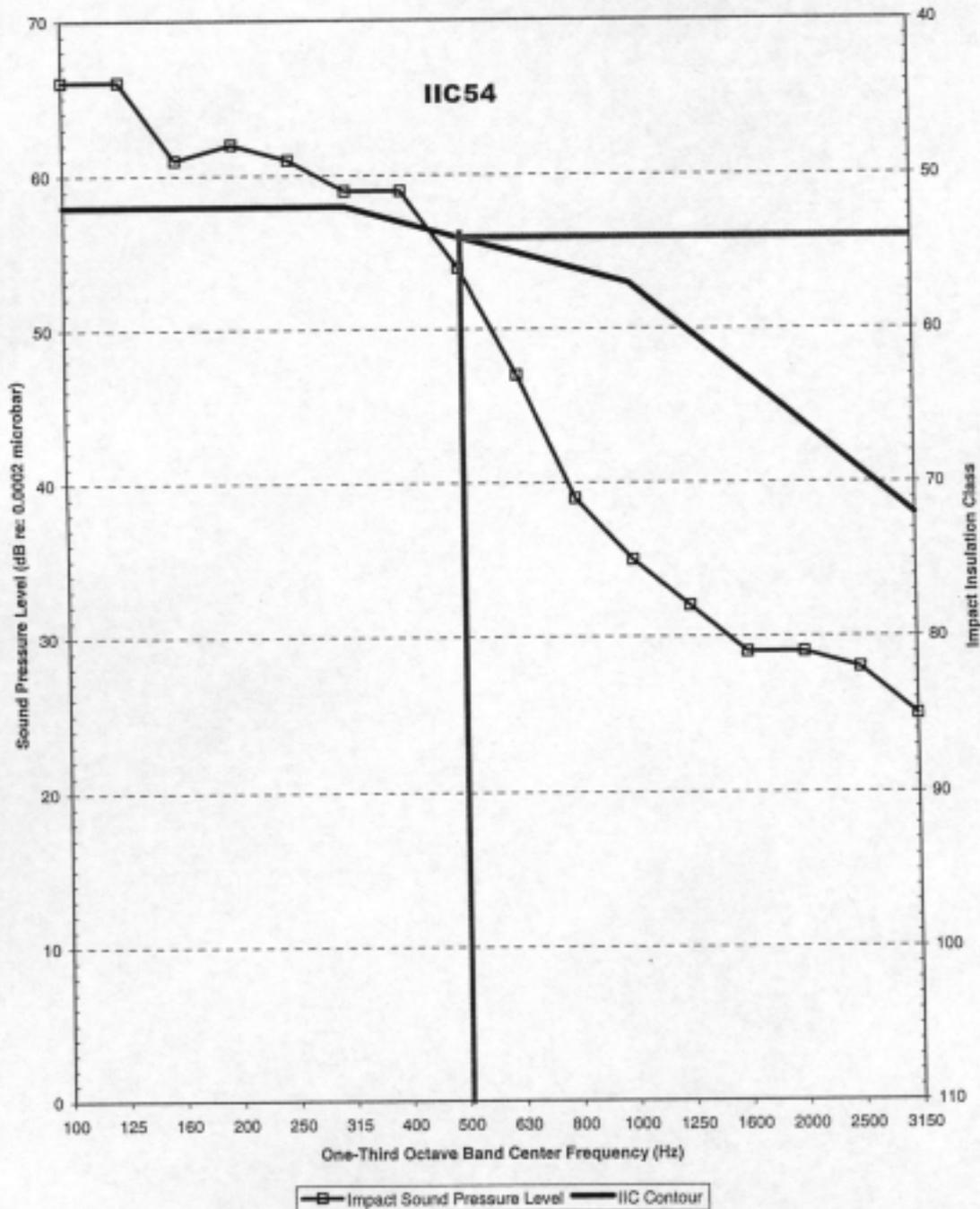
PRECISION

The 95% uncertainty level for each tapping machine location is less than 3 dB for the 1/3 octave bands centered in the range from 100 to 400 Hz and less than 2.5 dB for the bands centered in the range from 500 to 3150 Hz.

For the floor/ceiling construction, the 95% uncertainty limits (ΔL_u) for the normalized sound pressure levels were determined to be less than 2 dB for the 1/3 octave bands centered in the range from 100 to 3500.

**ENGINEERED HARDWOOD FLOORING
OVER PROTECTO WRAP'S WHISPER MAT HW**

Impact Insulation Class



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REMARKS

1. Curing Period: None
2. Ambient Temperature: 71 °F
3. Relative Humidity: 21%

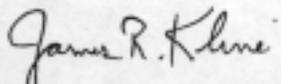
CONCLUSION

The test method employed for this test has no pass-fail criteria, therefore, the evaluation of the test results is left to the discretion of the client.

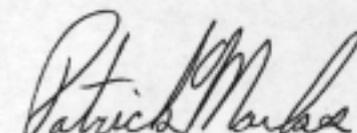
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Date of Test: February 28, 2003

Report Approved By:


James R. Kline
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Job No. 3039179

March 5, 2003

REPORT NO. 3039179-002

**SOUND TRANSMISSION LOSS TEST
AND CLASSIFICATION OF 3/8 INCH THICK ENGINEERED HARDWOOD FLOORING
OVER PROTECTO WRAP'S WHISPER MAT HW
UNDERLAYMENT ON A FLOOR/CEILING ASSEMBLY**

RENDERED TO

**TORAY PLASTICS (AMERICA), INC.
500 TORAY DRIVE
FRONT ROYAL, VA 22630**

INTRODUCTION

This report gives the results of a Sound Transmission Loss test and the determination of the Sound Transmission Class of engineered hardwood flooring over underlayment. The materials were selected and supplied by the client and received at the laboratories on February 18 and 24, 2003. The test sample appeared to be in new, unused condition upon arrival.

AUTHORIZATION

Purchase Order No. IN/07081 from Toray Plastics (America), Inc.

TEST METHOD

The specimen was tested in accordance with the American Society for Testing and Materials designation ASTM E90-99, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions", and classified in accordance with the American Society for Testing and Materials designation ASTM E413-87 (Reapproved 1999), "Classification for Rating Sound Insulation".

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GENERAL

The sound-insulating property of a partition element is expressed in terms of the sound transmission loss. The procedure for determining this quantity is to mount (and perimeter seal) the test specimen as a partition between two reverberation rooms. Sound is introduced in one of the rooms (the source room) and measurements are made of the noise reduction between source room and receiving room. The rooms are so arranged and constructed that the only significant sound transmission between them is through the test specimen.

The purpose of the Sound Transmission Class (STC) is to provide a single figure rating that can be used for comparing the sound-insulating properties of partition elements used for general building design purposes. The higher the rating (STC) the greater the sound insulating properties of the partition.

DESCRIPTION OF TEST ASSEMBLY

The test floor is a 100 sq. ft. opening that forms the horizontal separation of the two rooms, one directly above the other. The structural members are open webbed wood floor trusses, 16 inches deep installed 24 inches on center. The sub flooring is 5/8 inch thick tongue and groove plywood. The bridging is a continuous 2 x 4 nailed to the bottom chord and the sides of the diagonals with 2 inch long nails. Single leaf RC-1 resilient channels (2 1/2 inch x 1/2 inch) were spaced 16 inches on center and attached to the bottom chord by screws. The insulation is 5 1/2 inches cellulose with a density of 1.6 pcf. The ceiling is gypsum board, 5/8 inches thick, with the long edges located between the joists perpendicular to the resilient channels. Short edges are staggered by 4 ft. Sheets are fastened to the resilient channels by means of 1 1/2 inch screws located 1/2 inch away from the edge and 3 inches from the long edges; screws are spaced 6 inches on center. Joints are taped and finished with two layers of compound.

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DESCRIPTION OF TEST SPECIMEN

The test specimen consisted of 3/8 inch thick by 3 inch wide tongue and groove Harris-Tarkett Engineered Hardwood Flooring (Maple Coffee) loose layed over Protecto Wrap's Whisper Mat HW Underlayment. The underlayment contained a rubberized adhesive on the bottom. The protective paper covering was not removed from the underlayment adhesive for the test. No adhesive was used between the flooring and the underlayment.

RESULTS OF TEST

1/3 Octave Band Center Frequency <u>Hz</u>	<u>Sound Transmission Loss in dB</u>
80	30
100	33
125	37
160	38
200	40
250	41
315	44
400	47
500	52
630	52
800	57
1000	59
1250	63
1600	65
2000	67
2500	69
3150	69
4000	70
5000	67
Sound Transmission Class	54

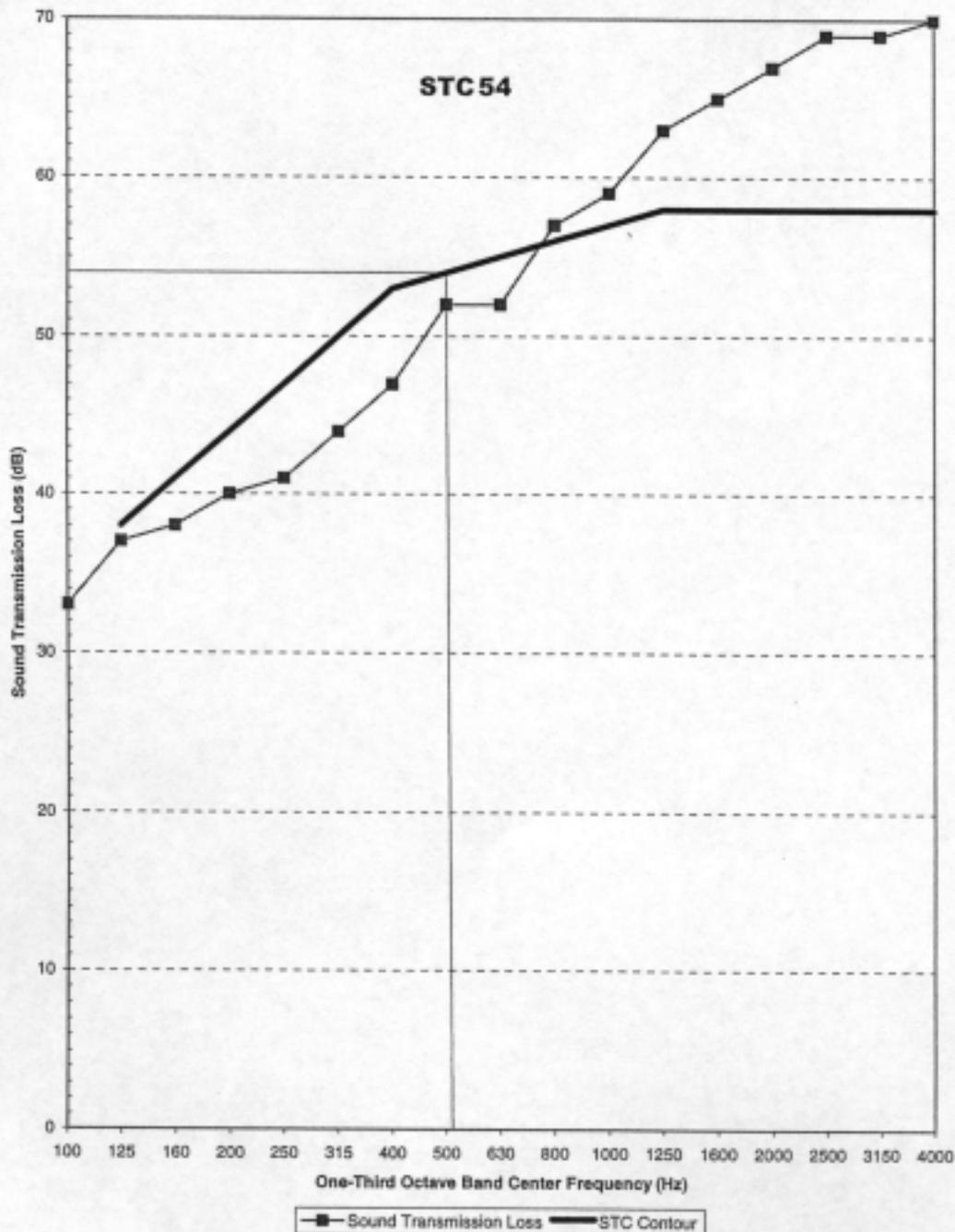
PRECISION

For any pair of rooms and microphone system, the 95% confidence interval ΔTL , for transmission loss must be less than the following.

<u>Range of One-Third Octave Bands</u>	<u>Transmission Loss Uncertainty, dB</u>	
	<u>Required</u>	<u>Actual</u>
125 and 160	3	<1.5
200 and 250	2	<1.5
315 - 4000	1	<1

ENGINEERED HARDWOOD FLOORING OVER PROTECTO WRAP'S WHISPER MAT HW

Sound Transmission Loss



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REMARKS

1. Curing Period: None
2. Ambient Temperature: 71°F
3. Relative Humidity: 22%

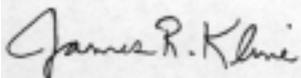
CONCLUSION

The test method employed for this test has no pass-fail criteria, therefore, the evaluation of the test results is left to the discretion of the client.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Date of Test: February 28, 2003

Report Approved By:



James R. Kline
Team Leader
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