

MEISTERWERKE SCHULTE GMBH

ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK

ASTM E90, ASTM E492, AND ASTM E2179 TESTING ON
LINDURA ENGINEERED HARDWOOD

SPECIMEN TYPE

Concrete Slab - 152 mm (6")

REPORT NUMBER

I9165.01-113-11-R1

TEST DATE

09/25/18

ISSUE DATE

10/05/18

REVISED DATE

10/17/18

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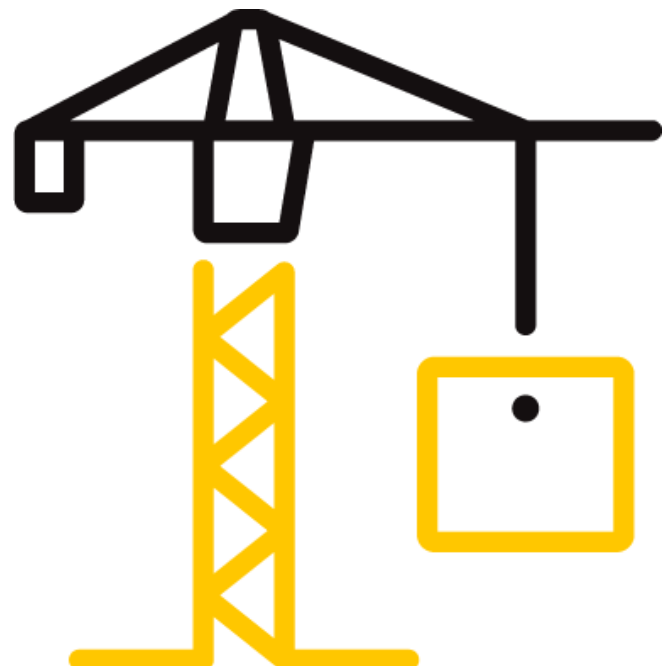
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TEST REPORT FOR MEISTERWERKE SCHULTE GMBH

Report No.: I9165.01-113-11-R1

Date: 10/17/18

REPORT ISSUED TO

MEISTERWERKE SCHULTE GMBH

Johannes Schulte Allee 5

59602 Ruthen-Meiste, GERMANY

SECTION 1

SCOPE

Intertek Building & Construction (B&C) was contracted by Meisterwerke Schulte Gmbh to perform testing in accordance with ASTM E90, ASTM E492, AND ASTM E2179 on Lindura Engineered Hardwood. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted in the VT test chambers at Intertek B&C located in York, Pennsylvania.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory.

SECTION 2

SUMMARY OF TEST RESULTS

DATA FILE NO.	I9165.01
SERIES/MODEL:	Lindura Engineered Hardwood
STC	53
IIC	50
ΔIIC	20

COMPLETED BY: Cody R. Snyder
Technician I - Acoustical
TITLE: Testing
SIGNATURE:
DATE: 10/17/18

COMPLETED BY: Jordan Strybos
Project Manager - Acoustical
TITLE: Testing
SIGNATURE:
DATE: 10/17/18

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SECTION 3**TEST METHODS**

The specimen was evaluated in accordance with the following:

ASTM E90-09 (2016), *Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions*

ASTM E413-16, *Classification for Rating Sound Insulation*

ASTM E492-09(2016)e1, *Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine*

ASTM E2179-03(2016), *Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors*

ASTM E989-06 (2012), *Classification for Determination of Impact Insulation Class (IIC)*

ASTM E2235-04 (2012), *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*

SECTION 4**MATERIAL SOURCE/INSTALLATION**

The full test specimen was assembled on the day of testing by B&C. All materials provided by the client were installed on an existing B&C assembly (Concrete Slab - 152 mm (6")) utilizing B&C-supplied materials. The assembly was installed in a steel test frame which was installed into the opening between the source and receive rooms in the test chamber. The test frame was isolated from the structure with dense neoprene gasket.

The total weight of the floor/ceiling assembly was 4179.4 kg / 9214 lbs. B&C will store samples of the test specimen for four years. Photographs of the test specimen are included in the report. A drawing of the test specimen is included in the report.

B&C will service this report for the entire test record retention period. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained by B&C for the entire test record retention period.

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**SECTION 5
EQUIPMENT**

INSTRUMENT	MANUFACTURER	MODEL	DESCRIPTION	ASSET #	CAL DATE
Data Acquisition Unit	National Instruments	PXI-4462	Data Acquisition Card	INT00977	08/18 *
Data Acquisition Unit	National Instruments	PXI-4462	Data Acquisition Card	65124	05/18 *
Data Acquisition Unit	National Instruments	PXI-4462	Data Acquisition Card	63763-1	06/18 *
Microphone Calibrator	Norsonic	Nor1251	Acoustical Calibrator	65105	06/18
Receive Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	65617	06/18
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63744	06/18
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63745	06/18
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63746	12/17
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	63747	07/18
Receive Room Environmental Indicator	Comet	T7510	Temperature and Humidity Transmitter	63810	10/17
				63811	10/17
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	INT01009	02/18
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63739	04/18
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63740	04/18
Source Room Microphone	PCB Piezotronics	378C20	Microphone and Preamplifier	63742	03/18
Source Room Microphone	PCB Electronics	378C20	Microphone and Preamplifier	63741	04/18
Source Room Environmental Indicator	Comet	T7510	Temperature and Humidity Transmitter	INT00603	03/18
Tapping Machine	Norsonic	Nor277	Tapping Machine	INT00936	12/17

* The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

VT RECEIVE ROOM VOLUME	158.86 m ³ (5610.1 ft ³)
VT SOURCE ROOM VOLUME	190 m ³ (6709.79 ft ³)

**SECTION 6
LIST OF OFFICIAL OBSERVERS**

NAME	COMPANY
Cody R. Snyder	Intertek B&C
Jordan Strybos	Intertek B&C

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SECTION 7**TEST PROCEDURE**

The microphones were calibrated before conducting the tests. The air temperature and relative humidity conditions were monitored and recorded during all measurements. The average temperature and humidity of both the source and received rooms are listed in Sections 10 and 11. The maximum and minimum temperatures and humidities of the receive room from the duration of the test are listed in Sections 12 through 15.

The airborne transmission loss test was conducted in accordance with the ASTM E90 test method using the single direction method. Two background noise sound pressure level and five sound absorption measurements were conducted at each of five microphone positions. Two sound pressure level measurements were made simultaneously in both rooms, at each of five microphone positions.

The impact sound transmission test was conducted in accordance with the ASTM E492 test method. Two background noise sound pressure level, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E492, and five sound absorption measurements were conducted at each of five microphone positions.

The delta impact insulation test was conducted in accordance with ASTM E2179 test method. In addition to the impact sound transmission test, two sound pressure level measurements with the tapping machine operating at each position specified by ASTM E492 with only the concrete slab installed were conducted at each of five microphone positions.

Detailed test procedures, data for flanking limit tests, repeatability measurements, and reference specimen tests are available upon request.

SECTION 8**TEST CALCULATIONS**

The STC (Sound Transmission Class), IIC (Impact Insulation Class), and Δ IIC (Delta Impact Insulation Class) ratings were calculated in accordance with ASTM E413, ASTM E989, and ASTM E2179, respectively.

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SECTION 9

TEST SPECIMEN DESCRIPTION

MATERIAL	Dimensions (mm/inch)	Thickness (mm/inch)	MANUFACTURER AND SERIES	QUANTITY	AVERAGE WEIGHT
Engineered Hardwood	2200 by 205 86.6 by 8.1	11 / 0.43	Lindura	10.98 m ² 118.19 ft ²	10.54 kg/m ² 2.16 lb/ft ²
	Note: Adhered to the underlayment with Bostik's BEST Wood Flooring Urethane Adhesive using a 6.35 mm by 6.35 mm by 6.35 mm (0.25" by 0.25" by 0.25") square notch trowel. Adhesive was allowed to cure per manufacturer's specifications.				
Rubber Underlayment	3023 by 1219 119 by 48	5 / 0.2	ECORE International QT4005	10.98 m ² 118.19 ft ²	3.92 kg/m ² 0.8 lb/ft ²
	Note: A sheet of 2 mil polyethylene plastic was adhered to the floor slab with Sprayway Fast Tack 85 spray adhesive. The underlayment was adhered to the sheeting with E-CORE E-Grip III adhesive, which was spread using a 1.59 mm by 1.59 mm by 1.59 mm (0.06" by 0.06" by 0.06") square notch trowel. Adhesive was allowed to cure per manufacturer's specifications.				
Concrete Slab	3023 by 3632 119 by 143	152.4 / 6	5000 PSI	10.98 m ² 118.19 ft ²	366.18 kg/m ² 75 lb/ft ²
	Note: Installed in a test frame flush to the source room. Mats of #5 reinforcing bars were placed 25.4 mm (1") from both the top and bottom of the slab, with bars spaced on 305 mm (12") centers in both directions. No noticeable shrinkage or cracking was visible on the specimen.				

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SECTION 10

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS



TEST DATE	9/25/2018				
DATA FILE NO.	I9165.01				
CLIENT	Meisterwerke Schulte GmbH				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECOPE International QT4005 Rubber Underlayment, 152.4 mm (6") 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m ²	Receive Temp.	19.8°C (67.6°F)	Source Temp.	21.7°C (71°F)
TECHNICIAN	JLA	Receive Humidity	77%	Source Humidity	77%

FREQ (Hz)	BACKGROUND SPL (dB)	ABSORPTION m ²	SOURCE SPL (dB)	RECEIVE SPL (dB)	SPECIMEN TL (dB)	95% CONFIDENCE LIMIT	NUMBER OF DEFICIENCIES
50	40.3	28.1	101	63	34	3.8	-
63	40.6	26.3	101	64	34	5.0	-
80	33.4	14.9	108	67	40	3.9	-
100	30.3	13.9	107	66	41	2.3	-
125	27.6	9.8	104	67	38	1.9	0
160	24.5	10.2	106	69	37	1.9	3
200	21.5	11.6	103	67	35	1.6	8
250	27.0	11.0	101	60	41	1.1	5
315	20.6	9.8	104	60	45	1.0	4
400	18.9	8.6	101	57	46	0.5	6
500	22.6	7.8	102	54	50	0.8	3
630	20.7	7.4	103	52	53	0.6	1
800	20.7	7.6	103	49	56	0.6	0
1000	20.4	7.5	103	45	60	0.6	0
1250	20.1	7.4	103	42	63	0.5	0
1600	15.0	7.4	103	40	65	0.4	0
2000	13.5	8.2	102	38	65	0.4	0
2500	10.8	9.1	101	36	66	0.4	0
3150	10.8	10.0	102	33	70	0.6	0
4000	8.2	10.8	103	31	72	0.6	0
5000	8.3	12.2	103	28	74	0.5	-
6300	8.2	14.9	97	19	77	0.8	-
8000	7.4	19.1	97	15	79	0.9	-
10000	6.9	23.0	92	9	80	0.7	-
STC Rating	53	<i>(Sound Transmission Class)</i>			Sum of Deficiencies	30	

Notes:

- 1) Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.
- 2) Specimen TL levels listed in red are potentially limited by the laboratory flanking limit.
- 3) Specimen TL levels listed in blue indicate the lower limit of the transmission loss.
- 4) Specimen TL levels listed in green indicate that there has been a filler wall correction applied

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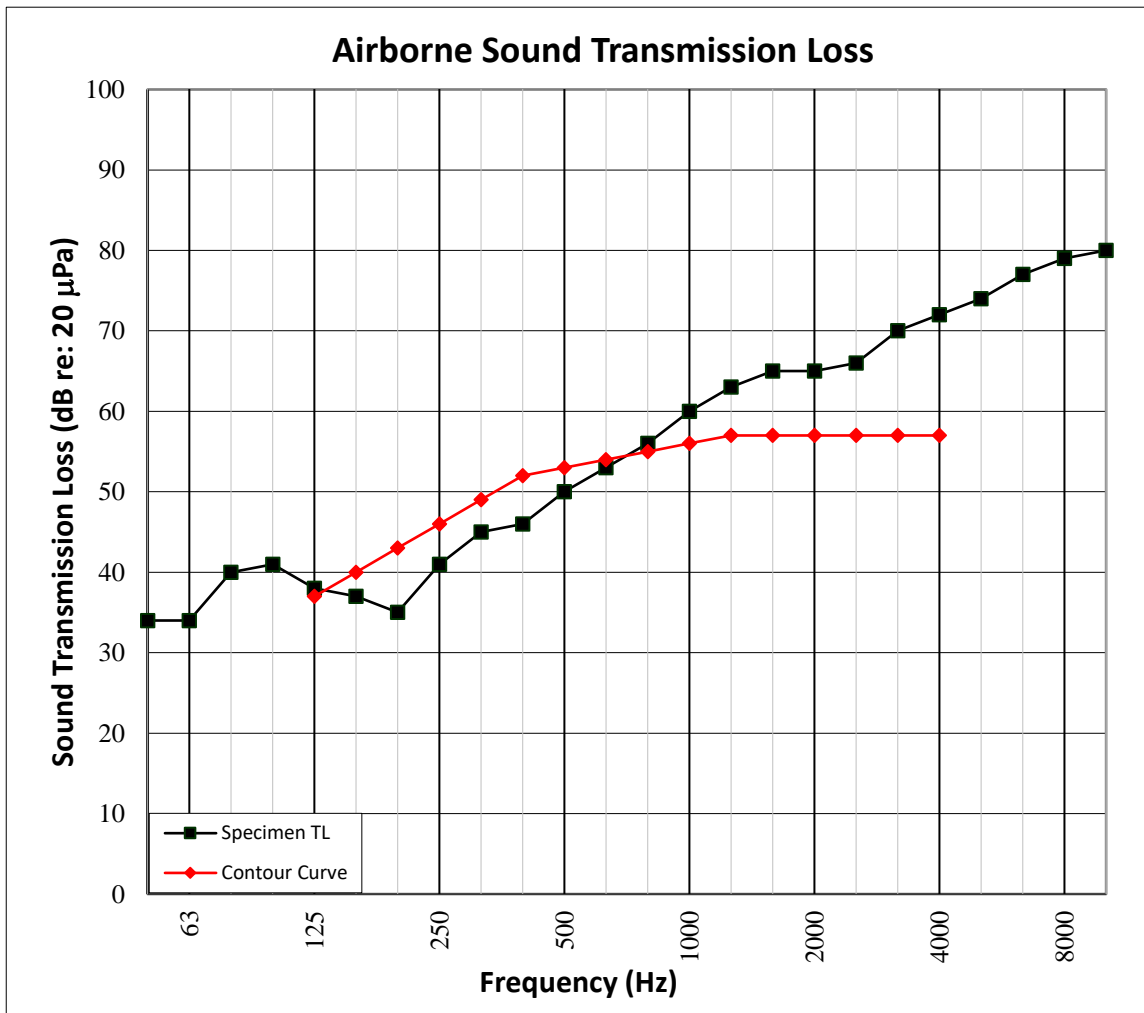
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SECTION 11

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS GRAPH



TEST DATE	9/25/2018				
DATA FILE NO.	I9165.01				
CLIENT	Meisterwerke Schulte GmbH				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECORE International QT4005 Rubber Underlayment, 152.4 mm (6") 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m ²	Receive Temp.	19.8°C (67.6°F)	Source Temp.	21.7°C (71°F)
TECHNICIAN	JLA	Receive Humidity	77%	Source Humidity	77%



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SECTION 12

TEST RESULTS - IMPACT SOUND TRANSMISSION



TEST DATE	9/25/2018				
DATA FILE NO.	I9165.01				
CLIENT	Meisterwerke Schulte GmbH				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECOPE International QT4005 Rubber Underlayment, 152.4 mm (6") 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m ²	Maximum Temp.	24.6°C (76.3°F)	Minimum Temp.	17°C (62.6°F)
TECHNICIAN	JLA	Max. Humidity	91%	Min. Humidity	62%

FREQ (Hz)	BACKGROUND SPL (dB)	ABSORPTION m ²	NORMALIZED IMPACT SPL (dB)	95% CONFIDENCE LIMIT	NUMBER OF DEFICIENCIES
50	37.3	25.5	60	2.6	-
63	40.0	24.5	57	3.7	-
80	33.4	14.9	55	1.8	-
100	28.1	13.4	58	0.9	0
125	28.6	10.3	58	1.4	0
160	26.5	9.5	64	0.7	2
200	23.0	11.3	69	0.7	7
250	28.0	11.1	66	0.5	4
315	21.3	9.7	65	0.2	3
400	18.4	8.3	67	0.3	6
500	22.1	7.9	64	0.3	4
630	20.5	7.2	63	0.3	4
800	20.3	7.6	60	0.5	2
1000	20.1	7.5	57	0.4	0
1250	17.9	7.5	53	0.4	0
1600	15.1	7.5	48	0.6	0
2000	13.4	8.2	46	0.6	0
2500	10.3	9.1	43	0.5	0
3150	10.8	9.9	38	0.6	0
4000	8.1	10.8	32	0.8	-
5000	8.4	12.1	28	1.0	-
6300	8.9	15.1	21	1.0	-
8000	7.6	19.1	14	0.8	-
10000	6.9	23.3	10	0.7	-
IIC Rating	50	<i>(Impact Insulation Class)</i>		Sum of Deficiencies	32

Notes: Receive Room levels less than 5 dB above the Background levels are highlighted in yellow.

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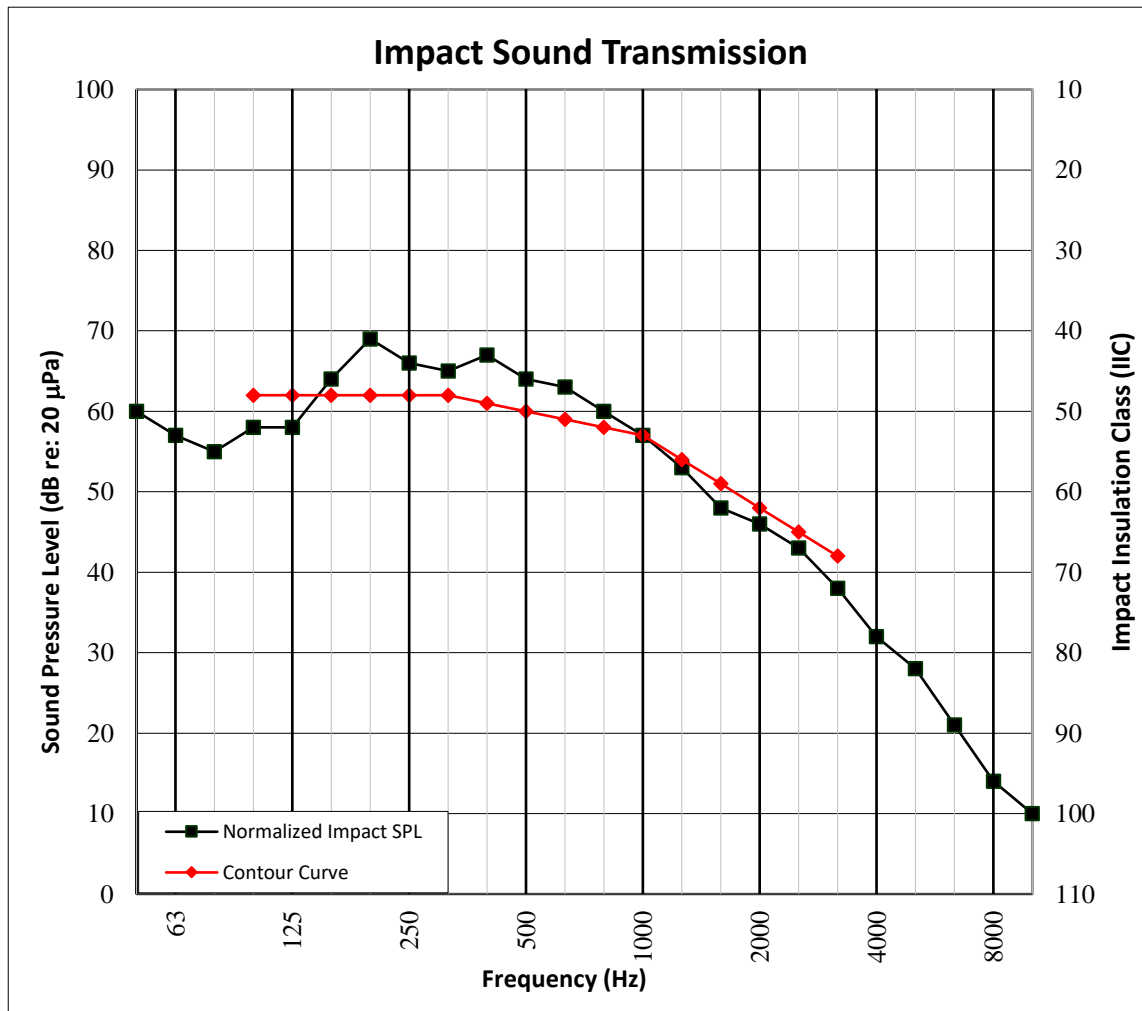
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SECTION 13

TEST RESULTS - IMPACT SOUND TRANSMISSION GRAPH



TEST DATE	9/25/2018				
DATA FILE NO.	I9165.01				
CLIENT	Meisterwerke Schulte GmbH				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECORE International QT4005 Rubber Underlayment, 152.4 mm (6") 5000 PSI Concrete Slab				
SPECIMEN AREA	10.98 m ²	Maximum Temp.	24.6°C (76.3°F)	Minimum Temp.	17°C (62.6°F)
TECHNICIAN	JLA	Max. Humidity	91%	Min. Humidity	62%



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SECTION 16

PHOTOGRAPHS

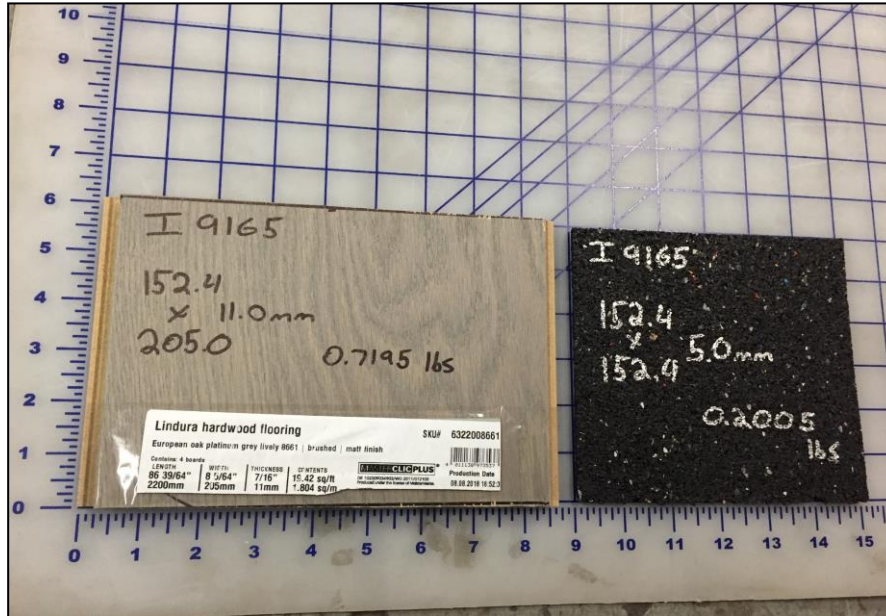


Photo No. 1
Close-Up of Test Specimen



Photo No. 2
Receive Room View of Test Specimen Installation

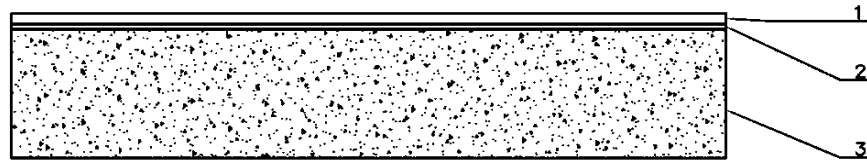
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SECTION 17

DRAWING



- 1-Floor Topping
- 2-Underlayment
- 3-Concrete Slab

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SECTION 18

REVISION LOG

REVISION #	DATE	PAGES	DESCRIPTION
R0	10/05/18	N/A	Original Report Issue
R1	10/17/18	All pages	Company name changed per client's request