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MEISTERWERKE SCHULTE GMBH
ACOUSTICAL PERFORMANCE TEST REPORT

SCOPE OF WORK
ASTM E90 AND ASTM E492 TESTING ON LINDURA ENGINEERED HARDWOOD

SPECIMEN TYPE
Open Web Truss - 457 mm (18")

REPORT NUMBER
I9165.04-113-11-R1

TEST DATE
09/27/18

ISSUE DATE **REVISED DATE**
10/05/18 10/17/18

RECORD RETENTION END
09/27/22

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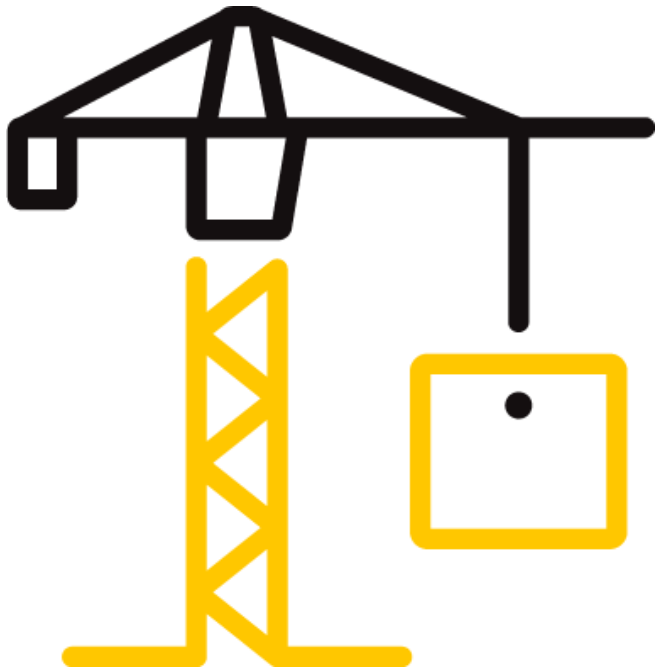

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TEST REPORT FOR MEISTERWERKE SCHULTE GMBH

Report No.: I9165.04-113-11-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 AND ASTM E492 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.	I9165.04
SERIES/MODEL:	Lindura Engineered Hardwood
STC	60
IIC	53

COMPLETED BY:	Cody R. Snyder	**COMPLETED BY:**	Jordan Strybos
TITLE:	Technician I - Acoustical Testing	**TITLE:**	Project Manager - Acoustical Testing
SIGNATURE:	Digitally Signed by: Cody Snyder	**SIGNATURE:**	Digitally Signed by: Jordan Strybos
DATE:	10/17/18	**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 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 (Open Web Truss - 457 mm (18")) 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 1020.5 kg / 2251.1 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	155.77 m^3 (5500.85 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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York, PA 17406

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Facsimile: 717-764-4129
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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 and 13.

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.

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) and IIC (Impact Insulation Class) ratings were calculated in accordance with ASTM E413 and ASTM E989, 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 m² 118.19 ft²	10.54 kg/m² 2.16 lb/ft²
	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 m² 118.19 ft²	3.92 kg/m² 0.8 lb/ft²
	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 ECORE 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.				
Floor Underlayment	3023 by 3632 119 by 143	19.1 / 0.75	USG Levelrock® 2500	10.98 m² 118.19 ft²	40.65 kg/m² 8.33 lb/ft²
	Note: Poured directly on top of the subfloor, cured a minimum of 14 days. No noticeable shrinkage or cracking was visible on the specimen.				
Oriented Strand Board Sheathing	1219 by 2438 48 by 96	18.8 / 0.74	N/A	10.98 m² 118.19 ft²	11.65 kg/m² 2.39 lb/ft²
	Note: Adhered to the floor trusses with Loctite PL 400 Subfloor adhesive. Fastened with 9D nails on 203 mm (8") centers along perimeter and 305 mm (12") centers along trusses.				
Fiberglass Insulation	520.7 by 3023 20.5 by 119	88.9 / 3.5	Johns Manville Unfaced R-13	10.98 m² 118.19 ft²	1.32 kg/m² 0.27 lb/ft²
	Note: Installed in the cavity between trusses, stapled flush with the subfloor				
Open Web Truss	88.9 by 2934 3.5 by 115.5	457.2 / 18	York PB Truss L/360	7 trusses	19.1 kg/truss 42 lb/truss
	Note: Installed on 610 mm (24") centers using JUS414 hanger brackets.				
Resilient Channel	68.6 by 3454 2.7 by 136	12.7 / 0.5	ClarkDietrich RC Deluxe™	27.6 lin m 90.55 lin ft	0.33 kg/m 0.22 lb/ft
	Note: Installed on 406 mm (16") centers perpendicular to the trusses. The measured thickness of the metal was 0.7 mm (0.03").				
Gypsum Panel	1219 by 3023 48 by 119	15.9 / 0.63	USG SHEETROCK® Brand FIRECODE® C Core	10.98 m² 118.19 ft²	11.9 kg/m² 2.44 lb/ft²
	Note: Fastened to the channels on 305 mm (12") centers with 25.4 mm (1") Type S bugle head screws. The seams of the gypsum panels were sealed with Pecora AC-20 FTR caulk and covered with pressure sensitive tape.				

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Report No.: I9165.04-113-11-R1
Date: 10/17/18

SECTION 10

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS

ACCREDITED Testing Laboratory

TEST DATE	9/27/2018				
DATA FILE NO.	I9165.04				
CLIENT	Meisterwerke Schulte Gmbh				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECORE International QT4005 Rubber Underlayment, 19.05 mm (0.75") USG Levelrock® 2500 Floor Underlayment, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 457.2 mm (18") York PB Truss L/360 Open Web Truss, 12.7 mm (0.5") ClarkDietrich RC Deluxe™ Resilient Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Receive Temp.**	20.6°C (69°F)	**Source Temp.**	21.7°C (71.1°F)
TECHNICIAN	CRS	**Receive Humidity**	61%	**Source Humidity**	61%

FREQ (Hz)	**BACKGROUND SPL** (dB)	**ABSORPTION** m²	**SOURCE SPL** (dB)	**RECEIVE SPL** (dB)	**SPECIMEN TL** (dB)	**95% CONFIDENCE LIMIT**	**NUMBER OF DEFICIENCIES**
80	35.3	16.4	108	69	37	3.6	-
100	32.9	12.9	106	67	38	2.4	-
125	30.7	10.1	104	64	40	1.5	4
160	29.4	9.7	104	63	42	1.2	5
200	26.8	10.4	102	56	46	1.3	4
250	29.2	10.9	99	51	48	1.0	5
315	23.3	9.7	103	52	52	1.0	4
400	22.6	7.9	102	49	55	0.7	4
500	21.0	7.6	103	48	57	0.6	3
630	18.9	7.2	103	46	59	0.5	2
800	18.3	7.3	103	43	62	0.4	0
1000	18.5	7.3	102	41	63	0.5	0
1250	16.2	7.2	102	39	65	0.4	0
1600	12.5	7.4	103	38	67	0.4	0
2000	11.3	8.1	102	38	66	0.3	0
2500	8.4	9.1	100	35	66	0.3	0
3150	6.0	9.7	102	32	71	0.5	0
4000	5.2	11.1	103	29	74	0.6	0
5000	5.2	12.8	103	26	76	0.6	-
6300	5.6	15.9	97	16	79	0.5	-
8000	6.1	20.4	96	12	81	0.8	-
10000	6.2	26.1	92	7	82	0.7	-
STC Rating	**60**	*(Sound Transmission Class)*			**Sum of Deficiencies**		**31**

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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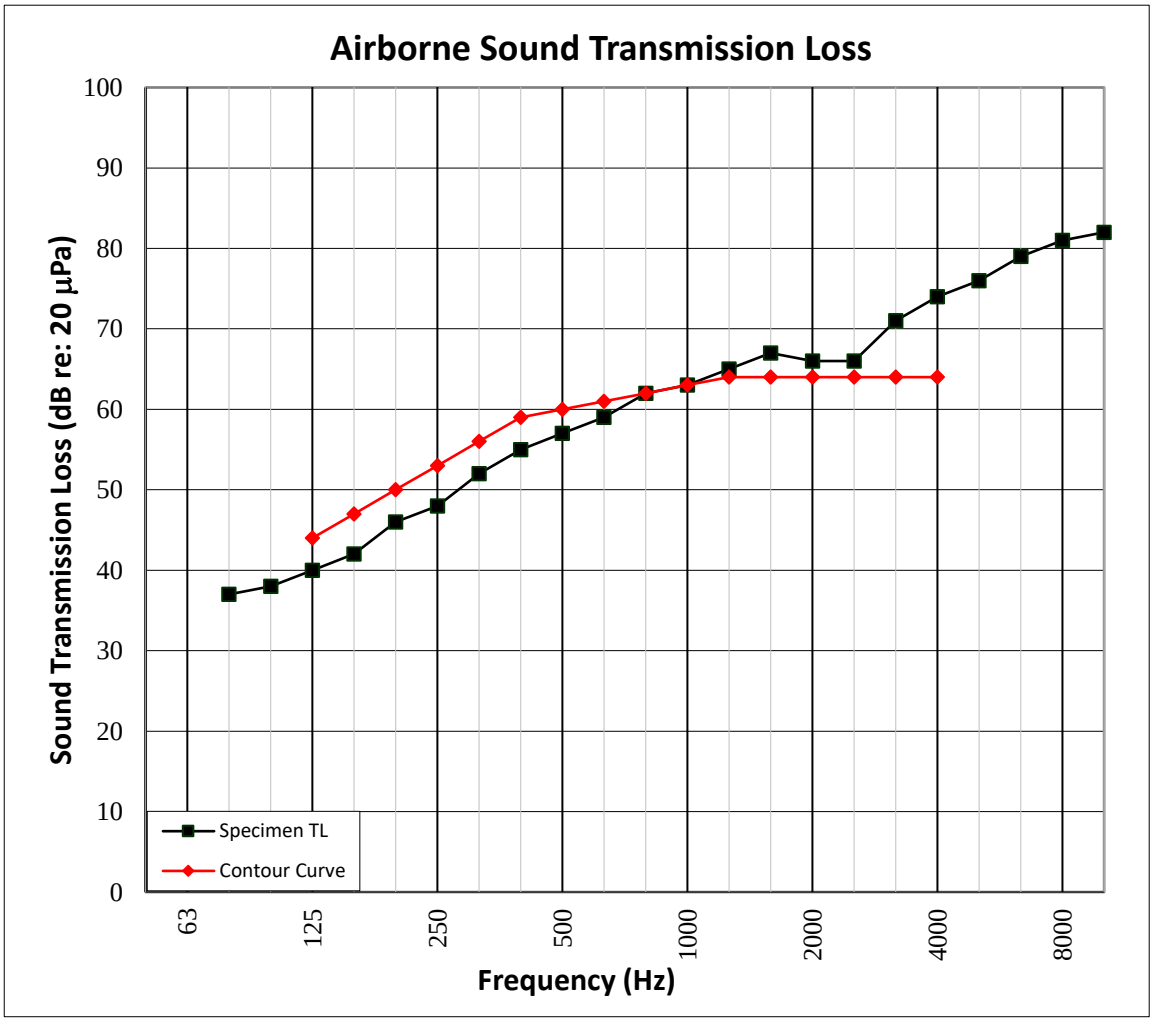
SECTION 11

TEST RESULTS - AIRBORNE SOUND TRANSMISSION LOSS GRAPH

ACCREDITED Testing Laboratory

TEST DATE	9/27/2018				
DATA FILE NO.	I9165.04				
CLIENT	Meisterwerke Schulte Gmbh				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECORE International QT4005 Rubber Underlayment, 19.05 mm (0.75") USG Levelrock® 2500 Floor Underlayment, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 457.2 mm (18") York PB Truss L/360 Open Web Truss, 12.7 mm (0.5") ClarkDietrich RC Deluxe™ Resilient Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Receive Temp.**	20.6°C (69°F)	**Source Temp.**	21.7°C (71.1°F)
TECHNICIAN	CRS	**Receive Humidity**	61%	**Source Humidity**	61%



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SECTION 12

TEST RESULTS - IMPACT SOUND TRANSMISSION

ACCREDITED
Testing Laboratory

TEST DATE	9/27/2018				
DATA FILE NO.	I9165.04				
CLIENT	Meisterwerke Schulte Gmbh				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECORE International QT4005 Rubber Underlayment, 19.05 mm (0.75") USG Levelrock® 2500 Floor Underlayment, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 457.2 mm (18") York PB Truss L/360 Open Web Truss, 12.7 mm (0.5") ClarkDietrich RC Deluxe™ Resilient Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	20.7°C (69.2°F)	**Minimum Temp.**	20.4°C (68.8°F)
TECHNICIAN	CRS	**Max. Humidity**	61%	**Min. Humidity**	60%

FREQ (Hz)	**BACKGROUND SPL** (dB)	**ABSORPTION** m²	**NORMALIZED IMPACT SPL** (dB)	**95% CONFIDENCE LIMIT**	**NUMBER OF DEFICIENCIES**
80	32.0	15.9	66	0.9	-
100	28.8	14.2	67	0.9	8
125	27.2	10.5	64	0.9	5
160	23.8	9.1	62	0.6	3
200	21.5	10.1	64	0.6	5
250	28.6	10.2	63	0.8	4
315	21.2	9.6	62	0.5	3
400	21.4	8.3	60	0.3	2
500	19.8	7.5	58	0.3	1
630	18.3	7.3	55	0.4	0
800	19.4	7.2	49	0.2	0
1000	18.3	7.2	46	0.2	0
1250	16.1	7.3	43	0.2	0
1600	12.6	7.4	43	0.1	0
2000	11.3	8.3	44	0.1	0
2500	8.6	9.2	43	0.2	1
3150	6.2	9.8	35	0.3	0
4000	5.3	11.1	30	0.3	-
5000	5.2	12.7	22	0.4	-
6300	5.6	16.0	18	0.6	-
8000	6.0	20.6	11	0.5	-
10000	6.2	25.9	10	0.5	-
IIC Rating	**53**	*(Impact Insulation Class)*		**Sum of Deficiencies**	**32**

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

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TEST REPORT FOR MEISTERWERKE SCHULTE GMBH

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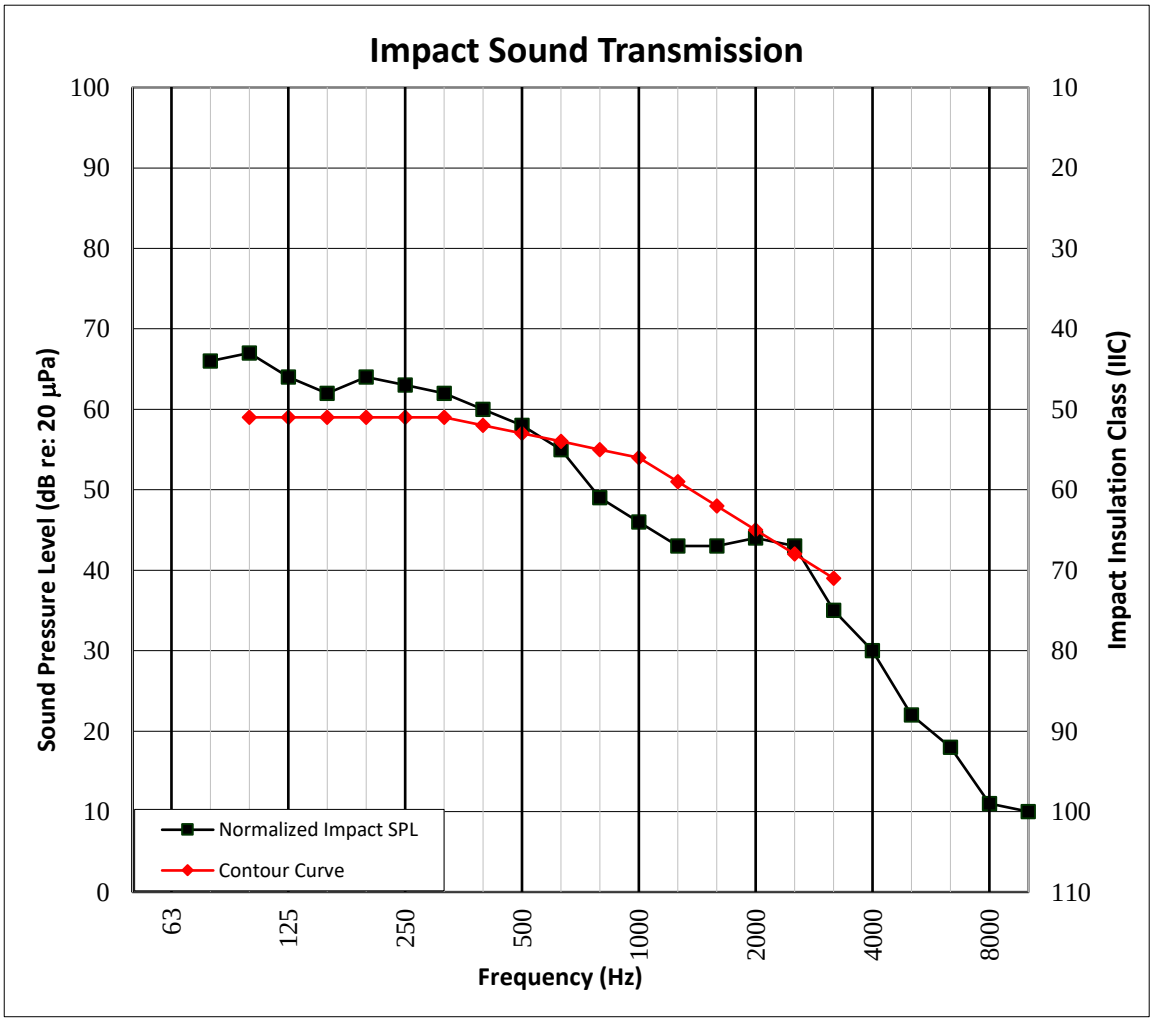
Date: 10/17/18

SECTION 13

TEST RESULTS - IMPACT SOUND TRANSMISSION GRAPH

ACCREDITED Testing Laboratory

TEST DATE	9/27/2018				
DATA FILE NO.	I9165.04				
CLIENT	Meisterwerke Schulte Gmbh				
DESCRIPTION	11 mm (0.43") Lindura Engineered Hardwood, 5 mm (0.2") ECORE International QT4005 Rubber Underlayment, 19.05 mm (0.75") USG Levelrock® 2500 Floor Underlayment, 18.8 mm (0.74") Oriented Strand Board Sheathing, 88.9 mm (3.5") Johns Manville Unfaced R-13 Fiberglass Insulation, 457.2 mm (18") York PB Truss L/360 Open Web Truss, 12.7 mm (0.5") ClarkDietrich RC Deluxe™ Resilient Channel, 15.9 mm (0.63") USG SHEETROCK® Brand FIRECODE® C Core Gypsum Panel				
SPECIMEN AREA	10.98 m²	**Maximum Temp.**	20.7°C (69.2°F)	**Minimum Temp.**	20.4°C (68.8°F)
TECHNICIAN	CRS	**Max. Humidity**	61%	**Min. Humidity**	60%



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SECTION 14
PHOTOGRAPHS

Photo No. 1
Close-Up of Test Specimen

Photo No. 2
Receive Room View of Test Specimen Installation

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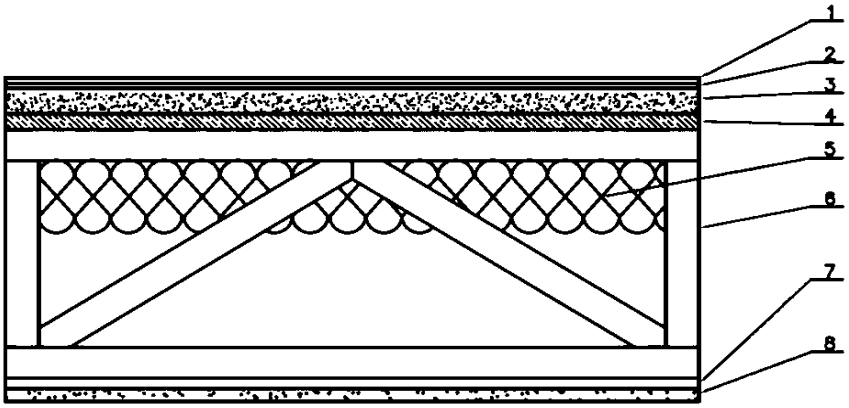
SECTION 15
DRAWING



1-Floor Topping
2-Underlayment
3-Subfloor Topping
4-Subfloor
5-Insulation
6-Truss
7-Ceiling Isolation
8-Ceiling

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SECTION 16
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