

## Test Report

SPONSOR: **Stauf USA LLC**  
Arlington, TN

**Impact Sound Transmission**  
**RAL™- IFC21-001**

CONDUCTED: 2021-02-16

Page 1 of 10

ON: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive

### TEST METHODOLOGY

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) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E2179-03 (2016): "Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors" with the exception that the thickness of the concrete slab was 203 mm (8.0 in.), rather than the specified maximum thickness of 200 mm (7.87 in.). The single number rating was calculated according to ASTM E989-18: "Standard Classification for Determination of Single-Number Metrics for Impact Noise." A complete description of the measurement procedure and room specifications are available upon request. The results presented in this report apply to the sample material as received from the test sponsor.

### STANDARD CONCRETE FLOOR

The laboratory's standard concrete floor is a fully cured thick concrete floor installed directly in the laboratory's 4.27 m (14.0 ft.) by 2.44 m (8 ft.) test opening. No additional ceiling materials were installed over the bottom face of the concrete.

#### **Concrete Slab**

---

Material: Wire-reinforced concrete  
Dimensions: 4 @ 610 mm (24 in.) x 4267 mm (168 in.)  
Thickness: 203 mm (8 in.)  
Overall Weight: 5023.08 kg (11074 lbs)  
Mass per Unit Area: 482.75 kg/m<sup>2</sup> (98.875 lbs/ft<sup>2</sup>)  
Installation: Laid in test opening over 152.4 mm (6 in.) wide knee walls constructed from isolated wood framing  
Joint undersides sealed with acoustical caulk and tape  
Top of joints filled with general purpose sand, sealed with premixed masonry joint compound

*Note: A 0.08 mm (0.003 in.) thick polyethylene sheet was adhered to the top face of the concrete slab with spray adhesive, in order to prevent damage to the slab surface.*

## Test Report

Stauf USA LLC  
2021-02-16

RAL™- IFC21-001  
Page 2 of 10

### SPECIMEN MEASUREMENTS & TEST CONDITIONS

The test specimen was designated by the sponsor as 1/2 in. engineered hardwood floor with SMP920 troweled adhesive. The building manager (Seth Priser) and RAL staff compiled a detailed construction specification for the test specimen as follows, in order of installation:

#### Test Specimen

---

##### **Adhesive**

Trade Name: SMP920 Polymer Wood Flooring Adhesive  
Manufacturer: Stauf USA LLC  
Dimensions: 2438 mm (96 in.) by 4267 mm (168 in.) as installed  
Thickness: Approximately 1.6 mm (0.06 in.) as installed  
Installation Tool: Trowel with proprietary Clip-on Notches, 3.97 mm (0.156 in.) x 3.18 mm (0.125 in.) x 4.76 mm (0.188 in.)  
Wet Weight: 34.93 kg (77 lbs)  
Mass per Unit Area: 3.36 kg/m<sup>2</sup> (0.69 lbs/ft<sup>2</sup>)  
Installation: Troweled over concrete slab, completed 2021-02-08 3:00 p.m.  
Cure Time: 8 days from installation to testing.

##### **Floor Covering**

Material: Engineered plywood planks with tongue-and-groove joints  
Dimensions: Plank width @ 82.55 mm (3.25 in.), excluding joint protrusions  
Joint protrusions @ 3.2 mm (0.125 in.) wide by 3.2 mm (0.125 in.) deep  
Thickness: 12.7 mm (0.5 in.)  
Overall Weight: 88.56 kg (195.25 lbs)  
Installation: Laid over adhesive, perpendicular to concrete slab  
Plank lengths varied to facilitate layout with staggered joints

## Test Report

Stauf USA LLC  
2021-02-16

RAL™- IFC21-001  
Page 3 of 10

### Overall Specimen Measurements

Dimensions: 2.44 m (96.0 in) wide by 4.27 m (168 in.) long  
Thickness: 217.5 mm (8.56 in.)  
Weight: 5146.57 kg (11346.25 lbs)  
Overall Area: 10.405 m<sup>2</sup> (112 ft<sup>2</sup>)  
Mass per Unit Area: 494.62 kg/m<sup>2</sup> (101.31 lbs/ft<sup>2</sup>)

### Test Aperture

Opening Size: 4.27 m (14.0 ft.) by 6.10 m (20 ft.)  
Filler Wall: Yes  
Aperture Size: 2.44 m (96.0 in) wide by 3.86 m (152.0 in) long  
Transmission Area: 9.414 m<sup>2</sup> (101.33 ft<sup>2</sup>)  
Sealed: Entire periphery (both sides) with dense mastic

### Test Environment

#### Source Room

Volume: 130.71 m<sup>3</sup>  
Temperature: 23.3 °C ± 0.0 °C  
Relative Humidity: 45.5 % ± 1.0 %

#### Receive Room

Volume: 82.6 m<sup>3</sup>  
Temperature: 23.3 °C ± 0.0 °C  
Relative Humidity: 45.0 % ± 2.0 %

#### Requirements

Temperature: 22° C +/- 5° C, not more than 3° C change over all tests.  
Relative Humidity: ≥ 30% RH; not more than +/- 3% change over all tests.

## Test Report

Stauf USA LLC  
2021-02-16

RAL™- IFC21-001  
Page 7 of 10

### TEST RESULTS

<u>FREQ.</u>	<u>L<sub>0</sub></u>	<u>L<sub>C</sub></u>	<u>L<sub>d</sub></u>	<u>L<sub>ref,c</sub></u>
100	60.9	53.2	7.6	59.4
125	56.5	44.9	11.6	55.9
160	59.6	45.7	14.0	54.1
200	61.7	40.2	21.5	47.0
250	70.4	44.5	25.9	43.2
315	64.7	38.2	26.5	43.0
400	67.2	41.0	26.2	43.8
500	67.4	42.8	24.6	45.9
630	65.3	37.4	27.9	43.1
800	68.1	40.7	27.4	44.1
1000	67.9	37.2	30.7	41.3
1250	67.8	30.7	37.2	34.9
1600	68.3	25.6	42.7	29.3
2000	71.3	22.5	48.8	23.2
2500	70.5	20.6	49.9	22.1
3150	70.2	16.1*	54.1*	17.9*

IIC<sub>c</sub> = 61  
ΔIIC = 33

### ABBREVIATION INDEX

- FREQ. = 1/3 OCTAVE BAND CENTER FREQUENCY (Hz)
- L<sub>0</sub> = NORMALIZED IMPACT SOUND PRESSURE LEVEL ON BARE STANDARD CONCRETE FLOOR (dB)
- L<sub>C</sub> = NORMALIZED IMPACT SOUND PRESSURE LEVEL WITH TEST SPECIMEN INSTALLED (dB)
- L<sub>d</sub> = NISPL ATTENUATION FROM TEST SPECIMEN = L<sub>0</sub> - L<sub>C</sub> (dB)
- L<sub>ref,C</sub> = NORMALIZED IMPACT SOUND PRESSURE LEVEL OF REFERENCE FLOOR WITH TEST SPECIMEN INSTALLED (dB)
- IIC<sub>c</sub> = THEORETICAL IMPACT INSULATION CLASS OF REFERENCE FLOOR + TEST SPECIMEN
- ΔIIC = IMPROVEMENT IN IMPACT INSULATION CLASS DUE TO TEST SPECIMEN

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

## Test Report


**Stauf USA LLC**  
2021-02-16

**RAL™- IFC21-001**  
Page 8 of 10

### TEST RESULTS (Continued)

Normalized impact sound pressure levels (NISPL) are tabulated in each of the sixteen one third octave bands from 100 Hz through 3150 Hz for both the standard concrete floor and the standard floor with the specimen installed. The observed difference in NISPL between the two configurations is applied to a reference concrete floor with an IIC rating of 28, as described in ASTM E2179-03 (2016) Table 1. The calculated impact insulation class of the reference floor with the specimen (IIC<sub>C</sub>) and the effective improvement of the rating due to the test specimen ( $\Delta$ IIC) are also provided. An \* indicates that the value has been adjusted for background noise levels and reflects a lower limit. A graphic presentation of the data appears on the following page.

Tested by

  
Dean Victor  
Lead Experimentalist

Report by

  
Malcolm Kelly  
Test Engineer, Acoustician

Approved by

  
Eric P. Wolfram  
Laboratory Manager

Digitally signed  
by Eric P Wolfram  
Date: 2021.03.03  
09:00:50 -06'00'

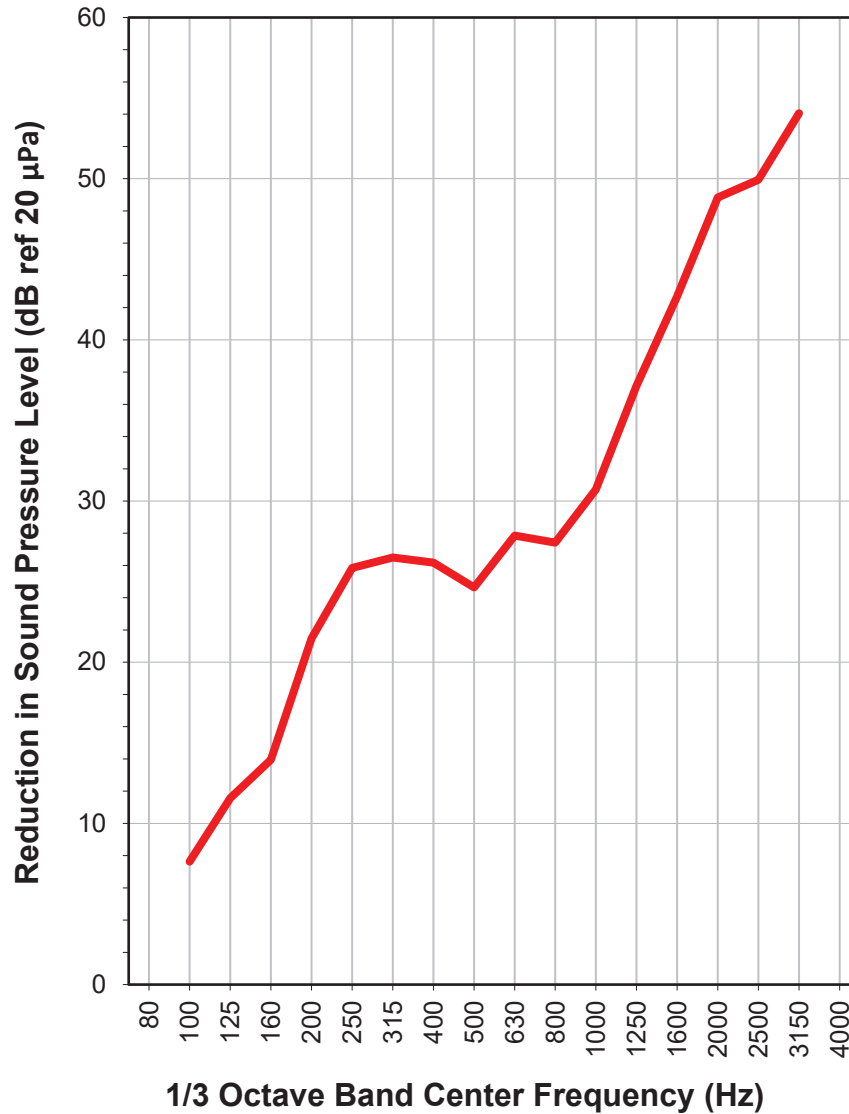
Test Report

Stauf USA LLC  
2021-02-16

RAL™- IFC21-001  
Page 9 of 10

Floor Covering Impact Reduction

1/2 in. engineered hardwood floor with SMP920 troweled adhesive



**ΔIIC = 33**

**NORMALIZED IMPACT SOUND REDUCTION OF  
TEST SPECIMEN ON A CONCRETE FLOOR**



RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2017 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT. THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

## Test Report

Stauf USA LLC  
2021-02-16

RAL™- IFC21-001  
Page 10 of 10

### APPENDIX A: Instruments of Traceability

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	3160-106974	2020-08-13	2021-08-13
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2020-04-07	2021-04-07
Bruel & Kjaer Tapping Machine	Type 3207	3151105	2020-10-27	2021-10-27
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
EXTECH Hygro 662	SD700	A083662	2020-12-18	2021-12-18
EXTECH Hygro 663	SD700	A083663	2020-12-18	2021-12-18

### APPENDIX B: Revisions to Original Test Report

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive (See Full Report)

<u>Date</u>	<u>Revision</u>
2021-02-18	Original report issued

---

END

## Test Report

SPONSOR: **Stauf USA LLC**  
Arlington, TN

**Impact Sound Transmission**  
**RAL™-IN21-012**

CONDUCTED: 2021-02-15

Page 1 of 13

ON: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling

### TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E492-09: "Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine." The single number rating of the specimen was calculated according to ASTM E989-18: "Standard Classification for Determination of Single-Number Metrics for Impact Noise." A description of the measurement procedure and room specifications are available upon request. The results presented in this report apply to the individual test specimen as described and assembled.

### SPECIMEN MEASUREMENTS & TEST CONDITIONS

The test specimen was designated by the sponsor as 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling. The construction contractor (Seth Priser) and RAL staff compiled a detailed construction specification as follows, in order of installation:

#### **Concrete Slab**

---

Material: Wire-reinforced concrete  
Dimensions: 4 @ 610 mm (24 in.) x 4267 mm (168 in.)  
Thickness: 203 mm (8 in.)  
Overall Weight: 5023.08 kg (11074 lbs)  
Mass per Unit Area: 482.75 kg/m<sup>2</sup> (98.875 lbs/ft<sup>2</sup>)  
Installation: Laid in test opening over 152.4 mm (6 in.) wide knee walls constructed from isolated wood framing  
Joint undersides sealed with acoustical caulk and tape  
Top of joints filled with general purpose sand, sealed with premixed masonry joint compound

*Note: A 0.08 mm (0.003 in.) thick polyethylene sheet was adhered to the top face of the concrete slab with spray adhesive, in order to prevent damage to the slab surface.*



## Test Report

Stauf USA LLC  
2021-02-15

RAL™-IN21-012  
Page 2 of 13

### Flooring Assembly

#### Adhesive

Trade Name: SMP920 Polymer Wood Flooring Adhesive  
Manufacturer: Stauf USA LLC  
Dimensions: 2438 mm (96 in.) by 4267 mm (168 in.) as installed  
Thickness: Approximately 1.6 mm (0.06 in.) as installed  
Installation Tool: Trowel with proprietary Clip-on Notches, 3.97 mm (0.156 in.) x 3.18 mm (0.125 in.) x 4.76 mm (0.188 in.)  
Wet Weight: 34.93 kg (77 lbs)  
Mass per Unit Area: 3.36 kg/m<sup>2</sup> (0.69 lbs/ft<sup>2</sup>)  
Installation: Troweled over concrete slab, completed 2021-02-08 3:00 p.m.  
Cure Time: 8 days from installation to testing.

#### Floor Covering

Material: Engineered plywood planks with tongue-and-groove joints  
Dimensions: Plank width @ 82.55 mm (3.25 in.), excluding joint protrusions  
Joint protrusions @ 3.2 mm (0.125 in.) wide by 3.2 mm (0.125 in.) deep  
Thickness: 12.7 mm (0.5 in.)  
Overall Weight: 88.56 kg (195.25 lbs)  
Installation: Laid over adhesive, perpendicular to concrete slab  
Plank lengths varied to facilitate layout with staggered joints

### Ceiling Assembly

#### Cold Rolled Channel

Material: Steel  
Dimensions: 3 pieces @ 12.7 mm (0.5 in.) wide by 2438 mm (96 in.) long by 38 mm (1.5 in.) deep  
Installation: Suspended from eye bolts in underside of concrete slabs via 12g hanging wire, oriented perpendicular to concrete slabs  
Spacing: 1219 mm (48 in.) on center  
Edge rows spaced 152 mm (6 in.) from sides of chamber  
203 mm (8 in.) from bottom of slabs to bottom of channels  
Overall Weight: 6.58 kg (14.5 lbs)  
Mass per Unit Length: 0.90 kg/m (0.60 lbs/ft)

## Test Report

Stauf USA LLC  
2021-02-15

RAL™-IN21-012  
Page 3 of 13

### Ceiling Assembly (continued)

---

#### Furring Channel

Material: Steel furring/hat channel  
Dimensions: 5 @ 51 mm (2 in.) wide by 3972 mm (156.375 in.) long  
Formed Depth: 22.2 mm (0.875 in.)  
Steel Thickness: 0.48 mm (0.019 in.)  
Installation: Fastened perpendicular to cold rolled channel with channel clips  
102 mm (4 in.) wide overlap secured with two #8 wafer head stud screws  
at furring channel joints  
Spacing: 610 mm (24 in.) on center  
Overall Weight: 7.94 kg (17.5 lbs)  
Mass per Unit Length: 0.40 kg/m (0.27 lbs/ft)

#### Insulation

Material: R-13 unfaced fiberglass insulation  
Dimensions: Pieces @ 368 mm (14.5 in.) wide by 2515 mm (99 in.) long  
Depth: 88.9 mm (3.5 in.)  
Overall Weight: 5.44 kg (12 lbs)  
Density: 6.50 kg/m<sup>3</sup> (0.41 lbs/ft<sup>3</sup>)  
Installation: Loose laid across furring channel

#### Gypsum Board

Material: Type C gypsum board  
Dimensions: 2 @ 1219 mm (48 in.) by 3048 mm (120 in.)  
2 @ 1219 mm (48 in.) by 914 mm (36 in.)  
Thickness: 15.9 mm (0.625 in.)  
Installation: Fastened to furring channel at center flange  
Fasteners: Type S bugle head drywall screws, length @ 31.8 mm (1.25 in.)  
Fastener Spacing: 305 mm (12 in.) on center  
Overall Weight: 118.05 kg (260.25 lbs)  
Mass per Unit Area: 12.22 kg/m<sup>2</sup> (2.50 lbs/ft<sup>2</sup>)

*Note: Joints and screw heads on the exposed face of the gypsum board in the receive room were treated with a thin bead of acoustical sealant and metal tape (0.23 kg (0.5 lbs) total).*

## Test Report

Stauf USA LLC  
2021-02-15

RAL™-IN21-012  
Page 4 of 13

### Overall Specimen Measurements

---

Dimensions: 2.44 m (96.0 in) wide by 4.27 m (168 in.) long  
Thickness: 459 mm (18.06 in.)  
Weight: 5284.8 kg (11651.0 lbs)  
Overall Area: 10.405 m<sup>2</sup> (112 ft<sup>2</sup>)  
Mass per Unit Area: 507.90 kg/m<sup>2</sup> (104.03 lbs/ft<sup>2</sup>)

### Test Aperture

---

Opening Size: 4.27 m (14.0 ft.) by 6.10 m (20 ft.)  
Filler Wall: Yes  
Aperture Size: 2.44 m (96.0 in) wide by 3.86 m (152.0 in) long  
Transmission Area: 9.414 m<sup>2</sup> (101.33 ft<sup>2</sup>)  
Sealed: Entire periphery (both sides) with dense mastic

### Test Environment

---

#### Source Room

Volume: 130.71 m<sup>3</sup>  
Temperature: 21.7 °C ± 0.0 °C  
Relative Humidity: 48.5 % ± 1.0 %

#### Receive Room

Volume: 80.29 m<sup>3</sup>  
Temperature: 23.6 °C ± 0.6 °C  
Relative Humidity: 47.5 % ± 3.0 %

#### Requirements

Temperature: 22° C +/- 5° C, not more than 3° C change over all tests.  
Relative Humidity: ≥ 30% RH; not more than +/- 3% change over all tests.

## Test Report

**Stauf USA LLC**  
2021-02-15

**RAL™-IN21-012**  
Page 9 of 13

### TEST RESULTS

The averaged sound pressure levels, normalized to a receive room reference absorption of 10 m<sup>2</sup>, are tabulated at the sixteen standard frequencies. A graphic presentation of the data and additional information appear on the following pages. The 95% confidence interval for the sound pressure level in the receive room is below the limits specified in Section A1.4 of ASTM E492-09.

<u>FREQ.</u>	<u>L<sub>n</sub></u>	<u>ΔL<sub>n</sub></u>	<u>DEV</u>	<u>FREQ.</u>	<u>L<sub>n</sub></u>	<u>ΔL<sub>n</sub></u>	<u>DEV</u>
100	46	4.79	8	800	13 **	3.67	0
125	41	3.11	3	1000	12 **	1.92	0
160	40	1.73	2	1250	5 **	0.59	0
200	32	0.92	0	1600	4 **	0.29	0
250	32	1.69	0	2000	4 **	0.27	0
315	23 *	1.28	0	2500	3 **	0.49	0
400	23 *	3.03	0	3150	5 **	0.65	0
500	23 *	3.28	0				
630	14 **	1.94	0				

IIC=74

### ABBREVIATION INDEX

FREQ. = FREQUENCY, HERTZ, (cps)

L<sub>n</sub> = NORMALIZED SOUND PRESSURE LEVEL, dB

ΔL<sub>n</sub> = 95% UNCERTAINTY LIMIT FOR L<sub>n</sub>, dB


DEV. = DEVIATION FROM SHIFTED IIC CONTOUR, dB (SUM OF DEV = 13 )

IIC = IMPACT INSULATION CLASS

\* = LEVEL CORRECTED DUE TO BACKGROUND NOISE PER E492 SEC 10.2.2

\*\* = LEVEL CORRECTED DUE TO BACKGROUND NOISE PER E492 SEC 10.2.3

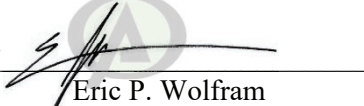
Tested by

  
Marc Sciaky  
Senior Experimentalist

Report by

  
Malcolm Kelly  
Test Engineer, Acoustician

Approved by

  
Eric P. Wolfram  
Laboratory Manager

Digitally signed by

Eric P Wolfram

Date: 2021.03.03

09:01:53 -06'00'

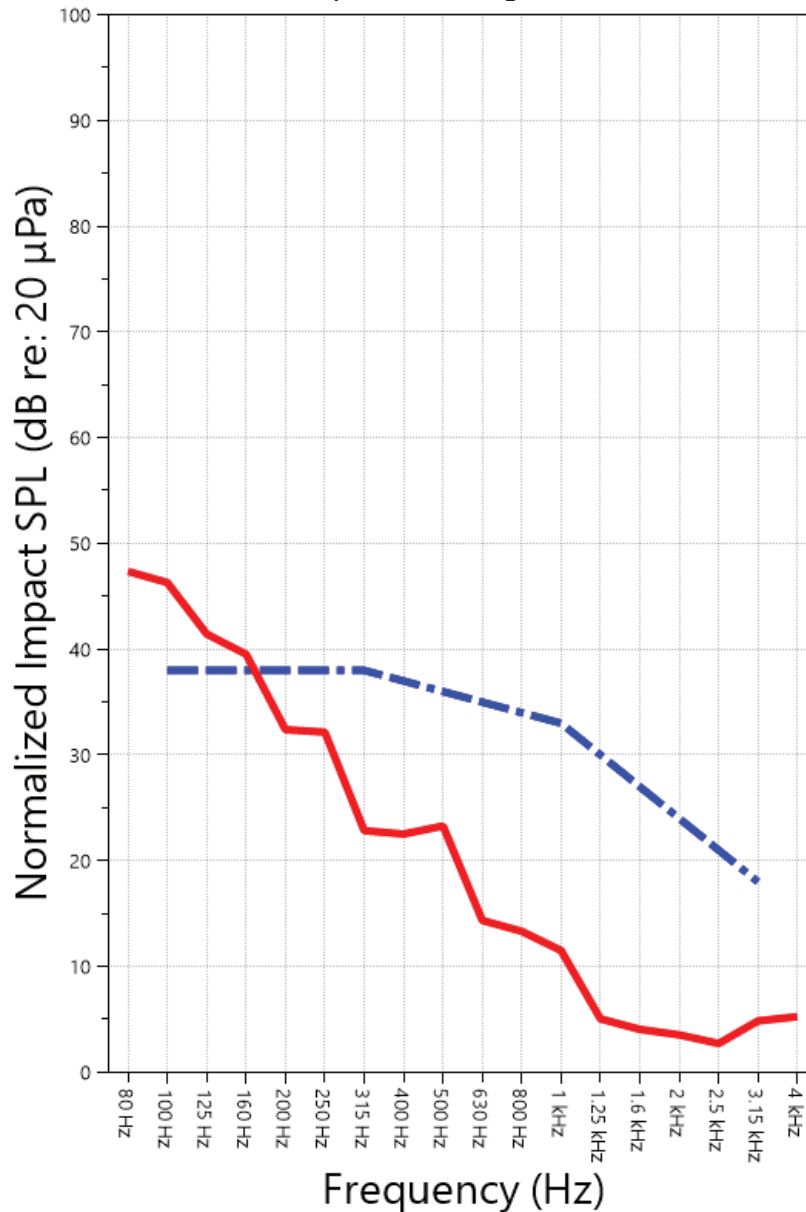
**Test Report**

**Stauf USA LLC**  
2021-02-15

**RAL™-IN21-012**  
Page 10 of 13

**IMPACT SOUND TRANSMISSION REPORT**

1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling



**IIC=74**

**— IMPACT SOUND PRESSURE LEVEL**  
**- - - IMPACT INSULATION CLASS CONTOUR**



RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2017 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT. THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.

## Test Report

Stauf USA LLC  
2021-02-15

**RAL™-IN21-012**  
Page 11 of 13

### APPENDIX A: Extended Frequency Range Data

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

*The following non-accredited data were obtained in accordance with ASTM E989-06 (2012), but extend beyond the defined frequency range of 100 Hz to 3,150 Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes.*

1/3 Octave Band Center Frequency (Hz)	$L_n$ (dB)	$\Delta L_n$ (dB)	Repeatability (dB)
31.5	53	5.89	4.45
40	59	3.48	3.47
50	60	5.78	2.55
63	58	10.03	5.07
80	47	6.05	2.23
100	46	4.79	3.47
125	41	3.11	2.85
160	40	1.73	2.46
200	32	0.92	1.93
250	32	1.69	0.73
315	23 *	1.28	0.79
400	23 *	3.03	2.17
500	23 *	3.28	1.93
630	14 **	1.94	0.21
800	13 **	3.67	1.41
1000	12 **	1.92	2.05
1250	5 **	0.59	1.49
1600	4 **	0.29	2.22
2000	4 **	0.27	2.51
2500	3 **	0.49	1.26
3150	5 **	0.65	1.51
4000	5 **	0.47	1.85
5000	8 **	0.65	1.82
6300	7 **	0.82	1.90
8000	8 **	1.02	0.88
10000	13 **	1.62	4.02
12500	9 **	1.68	5.26

\* Level corrected due to proximity to background noise per E492 Section 10.2.2

\*\* Level corrected due to proximity to background noise per E492 Section 10.2.3, represents lower limit of specimen performance

## Test Report

Stauf USA LLC  
2021-02-15

RAL™-IN21-012  
Page 12 of 13

### APPENDIX B: Glossary for Variability Metrics

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

$\Delta L_n$ , the 95% confidence interval for the reported normalized sound pressure level, is calculated from the standard deviation of the set of sound pressure levels measured during this individual test. This metric is calculated in an effort to quantify the variability in measured levels due to the combined influences of varying sound pressure level in the receive room and changes in specimen response for different tapping machine locations.

**Repeatability**, expressed as a 95% confidence interval, is calculated from the standard deviation in normalized sound pressure level as obtained from a total of six consecutive tests conducted according to this test method by RAL from 2019-02-07 to 2019-02-12. The tests were performed on a specimen composed of 152.4 mm (6 in.) thick concrete slabs, which was left installed and unaltered between tests. This metric provides an estimate of the variation in results that might be observed if the test were repeated with no change to the installed specimen. Note that repeatability will vary with the construction type.

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

## Test Report

Stauf USA LLC  
2021-02-15

**RAL™-IN21-012**  
Page 13 of 13

### APPENDIX C: Instruments of Traceability

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	3160-106974	2020-08-13	2021-08-13
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2020-04-07	2021-04-07
Bruel & Kjaer Tapping Machine	Type 3207	3151105	2020-10-27	2021-10-27
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
EXTECH Hygro 662	SD700	A083662	2020-12-18	2021-12-18
EXTECH Hygro 663	SD700	A083663	2020-12-18	2021-12-18

### APPENDIX D: Revisions to Original Test Report

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

<u>Date</u>	<u>Revision</u>
2021-02-18	Original report issued

---

END



SPONSOR: **Stauf USA LLC**  
 Arlington, TN  
 CONDUCTED: 2021-02-15

Report Referenced: **RAL™-IN21-012**  
 Page 1 of 1

ON: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Test Report for Details)

**Nonstandard Appendix E to ASTM E492-09 Impact Transmission Report**

Current priorities in the architectural acoustics community involve the development of more nuanced impact insulation metrics. Acoustics consultants and end users have observed that assemblies with equal Impact Insulation Class (IIC) ratings can sound substantially different and prompt differing amounts of customer complaints. Impact insulation metrics that are newly standardized or still in development seek to quantify the performance of floor-ceiling assemblies within certain ranges of sound frequency. These metrics would ideally correlate more strongly to subjective user experience and predict how the nature of the impact source will affect the response of the floor-ceiling construction.

Standard Classification ASTM E3222-20a provides a method for calculating the **High-Frequency Impact Insulation Class (HIIC)**, using normalized impact sound pressure level ( $L_n$ ) data at frequency bands from 400 Hz to 3150 Hz. In multi-family housing, high-frequency impact sound correlates to common sources such as the impacts of hard-heeled shoes, dragging furniture, dog toenails, and objects dropped on hard-surfaced flooring.

Methods for parametrizing insulation of low-frequency impact sound are still under deliberation; no calculation method has yet been standardized. A preliminary proposed method for calculating the **Low-Frequency Impact Insulation Class (LIIC)** uses normalized impact sound pressure level ( $L_n$ ) data at frequency bands from 50 Hz to 80 Hz. Low-frequency impact noise correlates to the “thudding” of footfalls on lightweight structures. Refer to the ASTM Work Item referenced below for details.

A summary of impact insulation ratings for the specimen described in the referenced test report is given below.

Referenced Document	Rating	Calculated Value
Standard Classification ASTM E989-18	<b>IIC</b>	<b>74</b>
Standard Classification ASTM E3222-20a	<b>HIIC</b>	<b>93</b>
Nonstandard Work Item ASTM WK63897	<b>LIIC</b>	<b>66</b>

Prepared by   
 Keith Kimberling  
 Associate Test Engineer, Acoustician

## Test Report

SPONSOR: **Stauf USA LLC**  
Arlington, TN

**Impact Sound Transmission**  
**RAL™-IN21-013**

CONDUCTED: 2021-02-16

Page 1 of 11

ON: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling

### TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E492-09: "Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine." The single number rating of the specimen was calculated according to ASTM E989-18: "Standard Classification for Determination of Single-Number Metrics for Impact Noise." A description of the measurement procedure and room specifications are available upon request. The results presented in this report apply to the individual test specimen as described and assembled.

### SPECIMEN MEASUREMENTS & TEST CONDITIONS

The test specimen was designated by the sponsor as 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling. The construction contractor (Seth Priser) and RAL staff compiled a detailed construction specification as follows, in order of installation:

#### **Concrete Slab**

---

Material: Wire-reinforced concrete  
Dimensions: 4 @ 610 mm (24 in.) x 4267 mm (168 in.)  
Thickness: 203 mm (8 in.)  
Overall Weight: 5023.08 kg (11074 lbs)  
Mass per Unit Area: 482.75 kg/m<sup>2</sup> (98.875 lbs/ft<sup>2</sup>)  
Installation: Laid in test opening over 152.4 mm (6 in.) wide knee walls constructed from isolated wood framing  
Joint undersides sealed with acoustical caulk and tape  
Top of joints filled with general purpose sand, sealed with premixed masonry joint compound

*Note: A 0.08 mm (0.003 in.) thick polyethylene sheet was adhered to the top face of the concrete slab with spray adhesive, in order to prevent damage to the slab surface.*

## Test Report

**Stauf USA LLC**  
2021-02-16

**RAL™-IN21-013**  
Page 2 of 11

### Flooring Assembly

#### Adhesive

Trade Name: SMP920 Polymer Wood Flooring Adhesive  
Manufacturer: Stauf USA LLC  
Dimensions: 2438 mm (96 in.) by 4267 mm (168 in.) as installed  
Thickness: Approximately 1.6 mm (0.06 in.) as installed  
Installation Tool: Trowel with proprietary Clip-on Notches, 3.97 mm (0.156 in.) x 3.18 mm (0.125 in.) x 4.76 mm (0.188 in.)  
Wet Weight: 34.93 kg (77 lbs)  
Mass per Unit Area: 3.36 kg/m<sup>2</sup> (0.69 lbs/ft<sup>2</sup>)  
Installation: Troweled over concrete slab, completed 2021-02-08 3:00 p.m.  
Cure Time: 8 days from installation to testing.

#### Floor Covering

Material: Engineered plywood planks with tongue-and-groove joints  
Dimensions: Plank width @ 82.55 mm (3.25 in.), excluding joint protrusions  
Joint protrusions @ 3.2 mm (0.125 in.) wide by 3.2 mm (0.125 in.) deep  
Thickness: 12.7 mm (0.5 in.)  
Overall Weight: 88.56 kg (195.25 lbs)  
Installation: Laid over adhesive, perpendicular to concrete slab  
Plank lengths varied to facilitate layout with staggered joints

## Test Report

Stauf USA LLC  
2021-02-16

RAL™-IN21-013  
Page 3 of 11

### Overall Specimen Measurements

---

Dimensions: 2.44 m (96.0 in) wide by 4.27 m (168 in.) long  
Thickness: 217.5 mm (8.56 in.)  
Weight: 5146.57 kg (11346.25 lbs)  
Overall Area: 10.405 m<sup>2</sup> (112 ft<sup>2</sup>)  
Mass per Unit Area: 494.62 kg/m<sup>2</sup> (101.31 lbs/ft<sup>2</sup>)

### Test Aperture

---

Opening Size: 4.27 m (14.0 ft.) by 6.10 m (20 ft.)  
Filler Wall: Yes  
Aperture Size: 2.44 m (96.0 in) wide by 3.86 m (152.0 in) long  
Transmission Area: 9.414 m<sup>2</sup> (101.33 ft<sup>2</sup>)  
Sealed: Entire periphery (both sides) with dense mastic

### Test Environment

---

#### Source Room

Volume: 130.71 m<sup>3</sup>  
Temperature: 23.3 °C ± 0.0 °C  
Relative Humidity: 45.5 % ± 1.0 %

#### Receive Room

Volume: 82.6 m<sup>3</sup>  
Temperature: 23.3 °C ± 0.0 °C  
Relative Humidity: 45.0 % ± 2.0 %

#### Requirements

Temperature: 22° C +/- 5° C, not more than 3° C change over all tests.  
Relative Humidity: ≥ 30% RH; not more than +/- 3% change over all tests.

## Test Report

**Stauf USA LLC**  
2021-02-16

**RAL™-IN21-013**  
Page 7 of 11

### TEST RESULTS

The averaged sound pressure levels, normalized to a receive room reference absorption of 10 m<sup>2</sup>, are tabulated at the sixteen standard frequencies. A graphic presentation of the data and additional information appear on the following pages. The 95% confidence interval for the sound pressure level in the receive room is below the limits specified in Section A1.4 of ASTM E492-09.

<u>FREQ.</u>	<u>L<sub>n</sub></u>	<u>ΔL<sub>n</sub></u>	<u>DEV</u>	<u>FREQ.</u>	<u>L<sub>n</sub></u>	<u>ΔL<sub>n</sub></u>	<u>DEV</u>
100	53	1.82	8	800	41	4.79	0
125	45	2.89	0	1000	37	6.68	0
160	46	2.15	1	1250	31	2.16	0
200	40	2.15	0	1600	26	1.40	0
250	44	3.27	0	2000	22	3.45	0
315	38	4.10	0	2500	21	6.49	0
400	41	3.94	0	3150	16 **	10.44	0
500	43	3.97	0				
630	37	2.60	0				

IIC=67

### ABBREVIATION INDEX

FREQ. = FREQUENCY, HERTZ, (cps)

L<sub>n</sub> = NORMALIZED SOUND PRESSURE LEVEL, dB

ΔL<sub>n</sub> = 95% UNCERTAINTY LIMIT FOR L<sub>n</sub>, dB


DEV. = DEVIATION FROM SHIFTED IIC CONTOUR, dB (SUM OF DEV = 9)

IIC = IMPACT INSULATION CLASS

\* = LEVEL CORRECTED DUE TO BACKGROUND NOISE PER E492 SEC 10.2.2

\*\* = LEVEL CORRECTED DUE TO BACKGROUND NOISE PER E492 SEC 10.2.3

Tested by

  
Dean Victor  
Lead Experimentalist

Report by

  
Malcolm Kelly  
Test Engineer, Acoustician

Approved by

  
Eric P. Wolfram  
Laboratory Manager

Digitally signed by Eric  
P Wolfram  
Date: 2021.03.03  
09:01:33 -06'00'

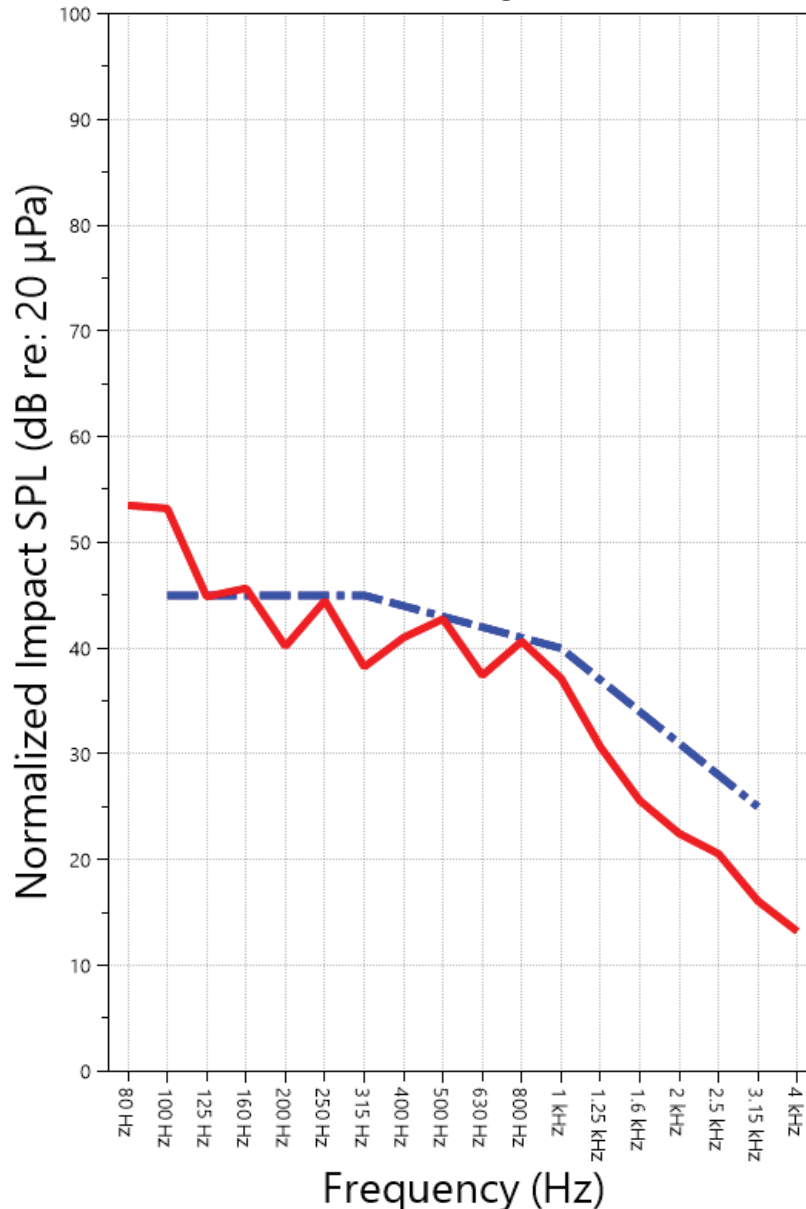
**Test Report**

Stauf USA LLC  
2021-02-16

**RAL™-IN21-013**  
Page 8 of 11

**IMPACT SOUND TRANSMISSION REPORT**

1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling



**IIC=67**

**— IMPACT SOUND PRESSURE LEVEL**  
**- . - . - . IMPACT INSULATION CLASS CONTOUR**



RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2017 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT. THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.

## Test Report

Stauf USA LLC  
2021-02-16

**RAL™-IN21-013**  
Page 9 of 11

### APPENDIX A: Extended Frequency Range Data

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

*The following non-accredited data were obtained in accordance with ASTM E989-06 (2012), but extend beyond the defined frequency range of 100 Hz to 3,150 Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes.*

1/3 Octave Band Center Frequency (Hz)	$L_n$ (dB)	$\Delta L_n$ (dB)	Repeatability (dB)
31.5	58	5.52	4.45
40	53	2.88	3.47
50	53	3.90	2.55
63	52	4.09	5.07
80	54	6.10	2.23
100	53	1.82	3.47
125	45	2.89	2.85
160	46	2.15	2.46
200	40	2.15	1.93
250	44	3.27	0.73
315	38	4.10	0.79
400	41	3.94	2.17
500	43	3.97	1.93
630	37	2.60	0.21
800	41	4.79	1.41
1000	37	6.68	2.05
1250	31	2.16	1.49
1600	26	1.40	2.22
2000	22	3.45	2.51
2500	21	6.49	1.26
3150	16 **	10.44	1.51
4000	13 **	2.80	1.85
5000	16 **	0.68	1.82
6300	12 **	0.93	1.90
8000	10 **	1.03	0.88
10000	14 **	1.62	4.02
12500	10 **	1.91	5.26

\* Level corrected due to proximity to background noise per E492 Section 10.2.2

\*\* Level corrected due to proximity to background noise per E492 Section 10.2.3, represents lower limit of specimen performance

## Test Report

Stauf USA LLC  
2021-02-16

RAL™-IN21-013  
Page 10 of 11

### APPENDIX B: Glossary for Variability Metrics

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

$\Delta L_n$ , the 95% confidence interval for the reported normalized sound pressure level, is calculated from the standard deviation of the set of sound pressure levels measured during this individual test. This metric is calculated in an effort to quantify the variability in measured levels due to the combined influences of varying sound pressure level in the receive room and changes in specimen response for different tapping machine locations.

**Repeatability**, expressed as a 95% confidence interval, is calculated from the standard deviation in normalized sound pressure level as obtained from a total of six consecutive tests conducted according to this test method by RAL from 2019-02-07 to 2019-02-12. The tests were performed on a specimen composed of 152.4 mm (6 in.) thick concrete slabs, which was left installed and unaltered between tests. This metric provides an estimate of the variation in results that might be observed if the test were repeated with no change to the installed specimen. Note that repeatability will vary with the construction type.



1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

## Test Report

Stauf USA LLC  
2021-02-16

**RAL™-IN21-013**  
Page 11 of 11

### APPENDIX C: Instruments of Traceability

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	3160-106974	2020-08-13	2021-08-13
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2020-04-07	2021-04-07
Bruel & Kjaer Tapping Machine	Type 3207	3151105	2020-10-27	2021-10-27
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
EXTECH Hygro 662	SD700	A083662	2020-12-18	2021-12-18
EXTECH Hygro 663	SD700	A083663	2020-12-18	2021-12-18

### APPENDIX D: Revisions to Original Test Report

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

<u>Date</u>	<u>Revision</u>
2021-02-18	Original report issued

---

END

SPONSOR: **Stauf USA LLC**  
Arlington, TN  
CONDUCTED: 2021-02-16

Report Referenced: **RAL™-IN21-013**  
Page 1 of 1

ON: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Test Report for Details)

**Nonstandard Appendix E to ASTM E492-09 Impact Transmission Report**

Current priorities in the architectural acoustics community involve the development of more nuanced impact insulation metrics. Acoustics consultants and end users have observed that assemblies with equal Impact Insulation Class (IIC) ratings can sound substantially different and prompt differing amounts of customer complaints. Impact insulation metrics that are newly standardized or still in development seek to quantify the performance of floor-ceiling assemblies within certain ranges of sound frequency. These metrics would ideally correlate more strongly to subjective user experience and predict how the nature of the impact source will affect the response of the floor-ceiling construction.

Standard Classification ASTM E3222-20a provides a method for calculating the **High-Frequency Impact Insulation Class (HIIC)**, using normalized impact sound pressure level ( $L_n$ ) data at frequency bands from 400 Hz to 3150 Hz. In multi-family housing, high-frequency impact sound correlates to common sources such as the impacts of hard-heeled shoes, dragging furniture, dog toenails, and objects dropped on hard-surfaced flooring.

Methods for parametrizing insulation of low-frequency impact sound are still under deliberation; no calculation method has yet been standardized. A preliminary proposed method for calculating the **Low-Frequency Impact Insulation Class (LIIC)** uses normalized impact sound pressure level ( $L_n$ ) data at frequency bands from 50 Hz to 80 Hz. Low-frequency impact noise correlates to the “thudding” of footfalls on lightweight structures. Refer to the ASTM Work Item referenced below for details.

A summary of impact insulation ratings for the specimen described in the referenced test report is given below.

Referenced Document	Rating	Calculated Value
Standard Classification ASTM E989-18	IIC	67
Standard Classification ASTM E3222-20a	HIIC	73
Nonstandard Work Item ASTM WK63897	LIIC	75

Prepared by \_\_\_\_\_



Keith Kimberling  
Associate Test Engineer, Acoustician

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

## Test Report

SPONSOR: **Stauf USA LLC**  
Arlington, TN

**Sound Transmission Loss**  
**RAL™-TL21-065**

CONDUCTED: 2021-02-15

Page 1 of 13

ON: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab,  
insulated suspended ceiling

### TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E90-09 (2016): "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements." The single number rating of the specimen was calculated according to ASTM E413-16: "Classification for Rating Sound Insulation." A description of the measurement procedure and room specifications is available upon request. The transmission loss values are for a single direction of measurement. The results presented in this report apply to the sample as received from the test sponsor.

### SPECIMEN MEASUREMENTS & TEST CONDITIONS

The test specimen was designated by the sponsor as 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling. The construction contractor (Seth Priser) and RAL staff compiled a detailed construction specification as follows, in order of installation:

#### **Concrete Slab**

---

Material: Wire-reinforced concrete  
Dimensions: 4 @ 610 mm (24 in.) x 4267 mm (168 in.)  
Thickness: 203 mm (8 in.)  
Overall Weight: 5023.08 kg (11074 lbs)  
Mass per Unit Area: 482.75 kg/m<sup>2</sup> (98.875 lbs/ft<sup>2</sup>)  
Installation: Laid in test opening over 152.4 mm (6 in.) wide knee walls constructed from isolated wood framing  
Joint undersides sealed with acoustical caulk and tape  
Top of joints filled with general purpose sand, sealed with premixed masonry joint compound

*Note: A 0.08 mm (0.003 in.) thick polyethylene sheet was adhered to the top face of the concrete slab with spray adhesive, in order to prevent damage to the slab surface.*

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

## Test Report

Stauf USA LLC  
2021-02-15

RAL™-TL21-065

Page 2 of 13

### Flooring Assembly

---

#### Adhesive

Trade Name: SMP920 Polymer Wood Flooring Adhesive  
Manufacturer: Stauf USA LLC  
Dimensions: 2438 mm (96 in.) by 4267 mm (168 in.) as installed  
Thickness: Approximately 1.6 mm (0.06 in.) as installed  
Installation Tool: Trowel with proprietary Clip-on Notches, 3.97 mm (0.156 in.) x 3.18 mm (0.125 in.) x 4.76 mm (0.188 in.)  
Wet Weight: 34.93 kg (77 lbs)  
Mass per Unit Area: 3.36 kg/m<sup>2</sup> (0.69 lbs/ft<sup>2</sup>)  
Installation: Troweled over concrete slab, completed 2021-02-08 3:00 p.m.  
Cure Time: 8 days from installation to testing.

#### Floor Covering

Material: Engineered plywood planks with tongue-and-groove joints  
Dimensions: Plank width @ 82.55 mm (3.25 in.), excluding joint protrusions  
Joint protrusions @ 3.2 mm (0.125 in.) wide by 3.2 mm (0.125 in.) deep  
Thickness: 12.7 mm (0.5 in.)  
Overall Weight: 88.56 kg (195.25 lbs)  
Installation: Laid over adhesive, perpendicular to concrete slab  
Plank lengths varied to facilitate layout with staggered joints

### Ceiling Assembly

---

#### Cold Rolled Channel

Material: Steel  
Dimensions: 3 pieces @ 12.7 mm (0.5 in.) wide by 2438 mm (96 in.) long by 38 mm (1.5 in.) deep  
Installation: Suspended from eye bolts in underside of concrete slabs via 12g hanging wire, oriented perpendicular to concrete slabs  
Spacing: 1219 mm (48 in.) on center  
Edge rows spaced 152 mm (6 in.) from sides of chamber  
203 mm (8 in.) from bottom of slabs to bottom of channels  
Overall Weight: 6.58 kg (14.5 lbs)  
Mass per Unit Length: 0.90 kg/m (0.60 lbs/ft)



RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2017 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT.

THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.

## Test Report

Stauf USA LLC  
2021-02-15

RAL™-TL21-065

Page 3 of 13

### Ceiling Assembly (continued)

---

#### Furring Channel

Material: Steel furring/hat channel  
Dimensions: 5 @ 51 mm (2 in.) wide by 3972 mm (156.375 in.) long  
Formed Depth: 22.2 mm (0.875 in.)  
Steel Thickness: 0.48 mm (0.019 in.)  
Installation: Fastened perpendicular to cold rolled channel with channel clips  
102 mm (4 in.) wide overlap secured with two #8 wafer head stud screws  
at furring channel joints  
Spacing: 610 mm (24 in.) on center  
Overall Weight: 7.94 kg (17.5 lbs)  
Mass per Unit Length: 0.40 kg/m (0.27 lbs/ft)

#### Insulation

Material: R-13 unfaced fiberglass insulation  
Dimensions: Pieces @ 368 mm (14.5 in.) wide by 2515 mm (99 in.) long  
Depth: 88.9 mm (3.5 in.)  
Overall Weight: 5.44 kg (12 lbs)  
Density: 6.50 kg/m<sup>3</sup> (0.41 lbs/ft<sup>3</sup>)  
Installation: Loose laid across furring channel

#### Gypsum Board

Material: Type C gypsum board  
Dimensions: 2 @ 1219 mm (48 in.) by 3048 mm (120 in.)  
2 @ 1219 mm (48 in.) by 914 mm (36 in.)  
Thickness: 15.9 mm (0.625 in.)  
Installation: Fastened to furring channel at center flange  
Fasteners: Type S bugle head drywall screws, length @ 31.8 mm (1.25 in.)  
Fastener Spacing: 305 mm (12 in.) on center  
Overall Weight: 118.05 kg (260.25 lbs)  
Mass per Unit Area: 12.22 kg/m<sup>2</sup> (2.50 lbs/ft<sup>2</sup>)

*Note: Joints and screw heads on the exposed face of the gypsum board in the receive room were treated with a thin bead of acoustical sealant and metal tape (0.23 kg (0.5 lbs) total).*

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

Stauf USA LLC  
2021-02-15

RAL™-TL21-065

Page 4 of 13

### Overall Specimen Measurements

Dimensions: 2.44 m (96.0 in) wide by 4.27 m (168 in.) long  
Thickness: 459 mm (18.06 in.)  
Weight: 5284.8 kg (11651.0 lbs)  
Overall Area: 10.405 m<sup>2</sup> (112 ft<sup>2</sup>)  
Mass per Unit Area: 507.90 kg/m<sup>2</sup> (104.03 lbs/ft<sup>2</sup>)

### Test Aperture

Opening Size: 4.27 m (14.0 ft) x 6.10 m (20.0 ft)  
Filler Wall: Yes  
Aperture Size: 2.44 m (96.0 in) wide by 3.86 m (152.0 in) high  
Transmission Area: 9.414 m<sup>2</sup> (101.33 ft<sup>2</sup>)  
Sealed: Entire periphery (both sides) with dense mastic

### Test Environment

#### Source Room

Volume: 130.71 m<sup>3</sup>  
Temperature: 22.2 °C ± 0.0 °C  
Relative Humidity: 49.0 % ± 0.0 %

#### Receive Room

Volume: 80.29 m<sup>3</sup>  
Temperature: 23.9 °C ± 0.0 °C  
Relative Humidity: 46.0 % ± 0.0 %

#### Requirements

Temperature: 22° C +/- 2° C, not more than 3° C change over all tests.  
Relative Humidity: ≥ 30%, not more than +/- 3% change over all tests.

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

**Stauf USA LLC**  
2021-02-15

**RAL™-TL21-065**

Page 9 of 13

### TEST RESULTS


Sound transmission loss values are tabulated at the eighteen standard frequency bands. A graphic presentation of the data and additional information appear on the following pages. The precision of the transmission loss test data is within the limits set by the ASTM Standard E90-09 (2016). See Appendix A for identification of corrections applied to the reported data.

<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>	<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>
100	38	0.70	0	800	69	0.27	0
125	43	0.86	3	1000	74	0.21	0
160	45	0.70	4	1250	78	0.32	0
200	45	0.48	7	1600	82	0.27	0
250	48	0.35	7	2000	84	0.26	0
315	54	0.27	4	2500	87	0.22	0
400	58	0.21	3	3150	92	0.30	0
500	62	0.20	0	4000	91	0.29	0
630	65	0.24	0	5000	87	0.28	0


STC=62

### ABBREVIATION INDEX

FREQ. = 1/3 OCTAVE BAND CENTER FREQUENCY, Hz  
 TL = TRANSMISSION LOSS, dB  
 ΔTL = 95% CONFIDENCE INTERVAL FOR TL MEASUREMENTS, dB  
 DEF. = DEFICIENCIES, dB BELOW SHIFTED STC CONTOUR (SUM OF DEF = 28)  
 STC = SOUND TRANSMISSION CLASS

Tested by   
 Marc Sciaky  
 Senior Experimentalist

Report by   
 Malcolm Kelly  
 Test Engineer, Acoustician

Approved by   
 Eric P. Wolfram  
 Laboratory Manager

Digitally signed by  
 Eric P Wolfram  
 Date: 2021.03.03  
 09:01:14 -06'00'

1512 S BATAVIA AVENUE  
 GENEVA, IL 60134  
 630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

**Test Report**

FOUNDED 1918 BY  
 WALLACE CLEMENT SABINE

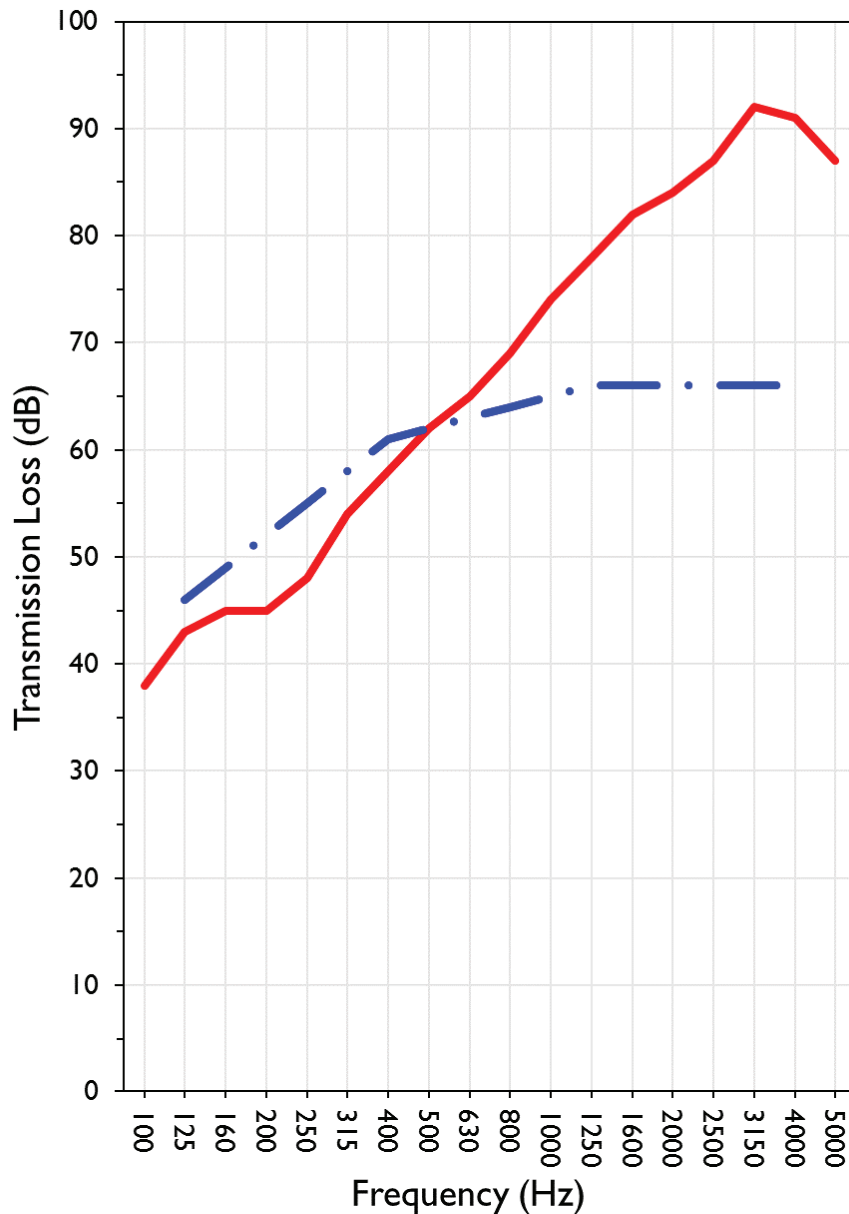
**Stauf USA LLC**  
 2021-02-15

**RAL™-TL21-065**

Page 10 of 13

**SOUND TRANSMISSION REPORT**

1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling



**STC=62**



**TRANSMISSION LOSS**  
**SOUND TRANSMISSION CLASS CONTOUR**



1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

Stauf USA LLC  
2021-02-15

**RAL™-TL21-065**  
Page 11 of 13

### **APPENDIX A: Extended Frequency Range Data**

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

*The following non-accredited data were obtained in accordance with ASTM E90-09 (2016), but extend beyond the defined frequency range of 100Hz to 5,000Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes. Sampling precision observed during this procedure is reported below. Corrections are detailed in Appendix B.*

1/3 Octave Band Center Frequency (Hz)	Sound Transmission Loss (dB)	Applicable Corrections	$\Delta$ TL (Eq. A2.5) (dB)	Repeatability (dB)
31.5	46	ZZ F	4.70	5.61
40	38	ZZ F	1.03	1.09
50	34	ZZ F	0.86	0.97
63	32	Z F	0.92	0.71
80	36	ZZ F	0.66	0.72
100	38	ZZ F	0.70	1.90
125	43	ZZ F	0.86	0.85
160	45	ZZ F	0.70	1.16
200	45	ZZ F	0.48	0.94
250	48	ZZ F	0.35	2.47
315	54	ZZ F	0.27	1.39
400	58	ZZ F	0.21	3.10
500	62	ZZ F	0.20	4.03
630	65	ZZ F	0.24	2.86
800	69	ZZ F	0.27	1.27
1000	74	ZZ F	0.21	1.18
1250	78	ZZ F	0.32	1.73
1600	82	ZZ F	0.27	0.86
2000	84	ZZ F	0.26	0.90
2500	87	ZZ F	0.22	0.96
3150	92	ZZ A F	0.30	1.74
4000	91	ZZ AA F	0.29	2.80
5000	87	ZZ AA F	0.28	2.43
6300	81	Z A F	0.23	1.96
8000	75	Z F	0.37	1.98
10000	67	Z A F	0.19	1.56
12500	61	Z F	0.20	3.53

## Test Report

Stauf USA LLC  
2021-02-15

RAL™-TL21-065  
Page 12 of 13

### APPENDIX B: Glossary of Standardized Corrections and Adjustments

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

#### Mark Interpretation

- A* Measured sound pressure levels in the receive room are within 10 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.
- AA* Measured sound pressure levels in the receive room are within 5 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.1. Transmission Loss values calculated from levels corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and a receive room with idealized ambient sound levels of  $(-\infty)$  dB.
- F* The reported Transmission Loss is within 10 dB of the laboratory flanking limit at the marked frequency band. The measured performance of the specimen may be limited by the performance of the laboratory building structure at this frequency band.
- Z* The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.7 to account for possible sound transmission through the filler assembly.
- ZZ* The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.8 to account for possible sound transmission through the filler assembly. Transmission Loss values corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and an idealized filler assembly with a Sound Transmission Class rating of  $(\infty)$ .

### APPENDIX C: Glossary of Variability Metrics

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

$\Delta TL$ , the 95% confidence interval for reported transmission loss values, is calculated from the standard deviation of the sets of measurements for source room sound pressure level, receive room sound pressure level, and receive room sound absorption. This metric is calculated in an effort to quantify the combined influences of room geometry, microphone positioning, and other varying environmental conditions on reported results.

**Repeatability**, expressed as a 95% confidence interval, is calculated from the standard deviation of transmission loss as obtained from a set of six (6) consecutive tests conducted according to this test method by RAL on 2020-02-14. The tests were performed on a specimen composed of an insulated wood truss floor-ceiling, using the same test opening as used in this report. This metric provides an estimate of the variation in results that might be observed if the test were repeated with no change to the installed specimen. Note that repeatability will vary with the construction type.

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

Stauf USA LLC  
2021-02-15

RAL™-TL21-065  
Page 13 of 13

### APPENDIX D: Instruments of Traceability

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	3160-106974	2020-08-13	2021-08-13
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2020-04-07	2021-04-07
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
EXTECH Hygro 662	SD700	A083662	2020-12-18	2021-12-18
EXTECH Hygro 663	SD700	A083663	2020-12-18	2021-12-18

### APPENDIX E: Revisions to Original Test Report

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, insulated suspended ceiling (See Full Report)

<u>Date</u>	<u>Revision</u>
2021-02-18	Original report issued

---

END

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

## Test Report

SPONSOR: **Stauf USA LLC**  
Arlington, TN

**Sound Transmission Loss**  
**RAL™-TL21-066**

CONDUCTED: 2021-02-16

Page 1 of 11

ON: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling

### TEST METHODOLOGY

Riverbank Acoustical Laboratories™ is accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) as an ISO 17025:2017 Laboratory (NVLAP Lab Code: 100227-0) and for this test procedure. The test reported in this document conformed explicitly with ASTM E90-09 (2016): "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements." The single number rating of the specimen was calculated according to ASTM E413-16: "Classification for Rating Sound Insulation." A description of the measurement procedure and room specifications is available upon request. The transmission loss values are for a single direction of measurement. The results presented in this report apply to the sample as received from the test sponsor.

### SPECIMEN MEASUREMENTS & TEST CONDITIONS

The test specimen was designated by the sponsor as 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling. The construction contractor (Seth Priser) and RAL staff compiled a detailed construction specification as follows, in order of installation:

#### **Concrete Slab**

---

Material: Wire-reinforced concrete  
Dimensions: 4 @ 610 mm (24 in.) x 4267 mm (168 in.)  
Thickness: 203 mm (8 in.)  
Overall Weight: 5023.08 kg (11074 lbs)  
Mass per Unit Area: 482.75 kg/m<sup>2</sup> (98.875 lbs/ft<sup>2</sup>)  
Installation: Laid in test opening over 152.4 mm (6 in.) wide knee walls constructed from isolated wood framing  
Joint undersides sealed with acoustical caulk and tape  
Top of joints filled with general purpose sand, sealed with premixed masonry joint compound

*Note: A 0.08 mm (0.003 in.) thick polyethylene sheet was adhered to the top face of the concrete slab with spray adhesive, in order to prevent damage to the slab surface.*

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

Stauf USA LLC  
2021-02-16

RAL™-TL21-066

Page 2 of 11

### Flooring Assembly

---

#### Adhesive

Trade Name: SMP920 Polymer Wood Flooring Adhesive  
Manufacturer: Stauf USA LLC  
Dimensions: 2438 mm (96 in.) by 4267 mm (168 in.) as installed  
Thickness: Approximately 1.6 mm (0.06 in.) as installed  
Installation Tool: Trowel with proprietary Clip-on Notches, 3.97 mm (0.156 in.) x 3.18 mm (0.125 in.) x 4.76 mm (0.188 in.)  
Wet Weight: 34.93 kg (77 lbs)  
Mass per Unit Area: 3.36 kg/m<sup>2</sup> (0.69 lbs/ft<sup>2</sup>)  
Installation: Troweled over concrete slab, completed 2021-02-08 3:00 p.m.  
Cure Time: 8 days from installation to testing.

#### Floor Covering

Material: Engineered plywood planks with tongue-and-groove joints  
Dimensions: Plank width @ 82.55 mm (3.25 in.), excluding joint protrusions  
Joint protrusions @ 3.2 mm (0.125 in.) wide by 3.2 mm (0.125 in.) deep  
Thickness: 12.7 mm (0.5 in.)  
Overall Weight: 88.56 kg (195.25 lbs)  
Installation: Laid over adhesive, perpendicular to concrete slab  
Plank lengths varied to facilitate layout with staggered joints



NVLAP LAB CODE 100227-0

RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2017 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT.

THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

Stauf USA LLC  
2021-02-16

RAL™-TL21-066

Page 3 of 11

### Overall Specimen Measurements

Dimensions: 2.44 m (96.0 in) wide by 4.27 m (168 in.) long  
Thickness: 217.5 mm (8.56 in.)  
Weight: 5146.57 kg (11346.25 lbs)  
Overall Area: 10.405 m<sup>2</sup> (112 ft<sup>2</sup>)  
Mass per Unit Area: 494.62 kg/m<sup>2</sup> (101.31 lbs/ft<sup>2</sup>)

### Test Aperture

Opening Size: 4.27 m (14.0 ft) x 6.10 m (20.0 ft)  
Filler Wall: Yes  
Aperture Size: 2.44 m (96.0 in) wide by 3.86 m (152.0 in) high  
Transmission Area: 9.414 m<sup>2</sup> (101.33 ft<sup>2</sup>)  
Sealed: Entire periphery (both sides) with dense mastic

### Test Environment

#### Source Room

Volume: 130.71 m<sup>3</sup>  
Temperature: 23.3 °C ± 0.0 °C  
Relative Humidity: 44.0 % ± 2.0 %

#### Receive Room

Volume: 82.6 m<sup>3</sup>  
Temperature: 23.3 °C ± 0.0 °C  
Relative Humidity: 43.5 % ± 1.0 %

#### Requirements

Temperature: 22° C +/- 2° C, not more than 3° C change over all tests.  
Relative Humidity: ≥ 30%, not more than +/- 3% change over all tests.

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

Stauf USA LLC  
2021-02-16

**RAL™-TL21-066**

Page 7 of 11

### TEST RESULTS

Sound transmission loss values are tabulated at the eighteen standard frequency bands. A graphic presentation of the data and additional information appear on the following pages. The precision of the transmission loss test data is within the limits set by the ASTM Standard E90-09 (2016). See Appendix A for identification of corrections applied to the reported data.


<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>	<u>FREQ.</u>	<u>TL</u>	<u>ΔTL</u>	<u>DEF.</u>
100	37	0.61	0	800	59	0.21	0
125	44	0.54	0	1000	63	0.10	0
160	42	0.61	2	1250	66	0.17	0
200	43	0.31	4	1600	68	0.23	0
250	44	0.23	6	2000	68	0.20	0
315	49	0.24	4	2500	72	0.15	0
400	49	0.33	7	3150	75	0.13	0
500	52	0.16	5	4000	77	0.18	0
630	55	0.21	3	5000	79	0.45	0

STC=57

### ABBREVIATION INDEX

FREQ. = 1/3 OCTAVE BAND CENTER FREQUENCY, Hz  
 TL = TRANSMISSION LOSS, dB  
 ΔTL = 95% CONFIDENCE INTERVAL FOR TL MEASUREMENTS, dB  
 DEF. = DEFICIENCIES, dB BELOW SHIFTED STC CONTOUR (SUM OF DEF = 31)  
 STC = SOUND TRANSMISSION CLASS

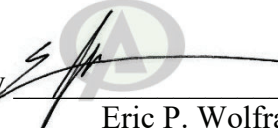
Tested by

  
Dean Victor  
Lead Experimentalist

Report by

  
Malcolm Kelly  
Test Engineer, Acoustician

Approved by

  
Eric P. Wolfram  
Laboratory Manager

Digitally signed  
by Eric P Wolfram  
Date: 2021.03.03  
09:00:33 -06'00'

1512 S BATAVIA AVENUE  
 GENEVA, IL 60134  
 630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

**Test Report**

FOUNDED 1918 BY  
 WALLACE CLEMENT SABINE

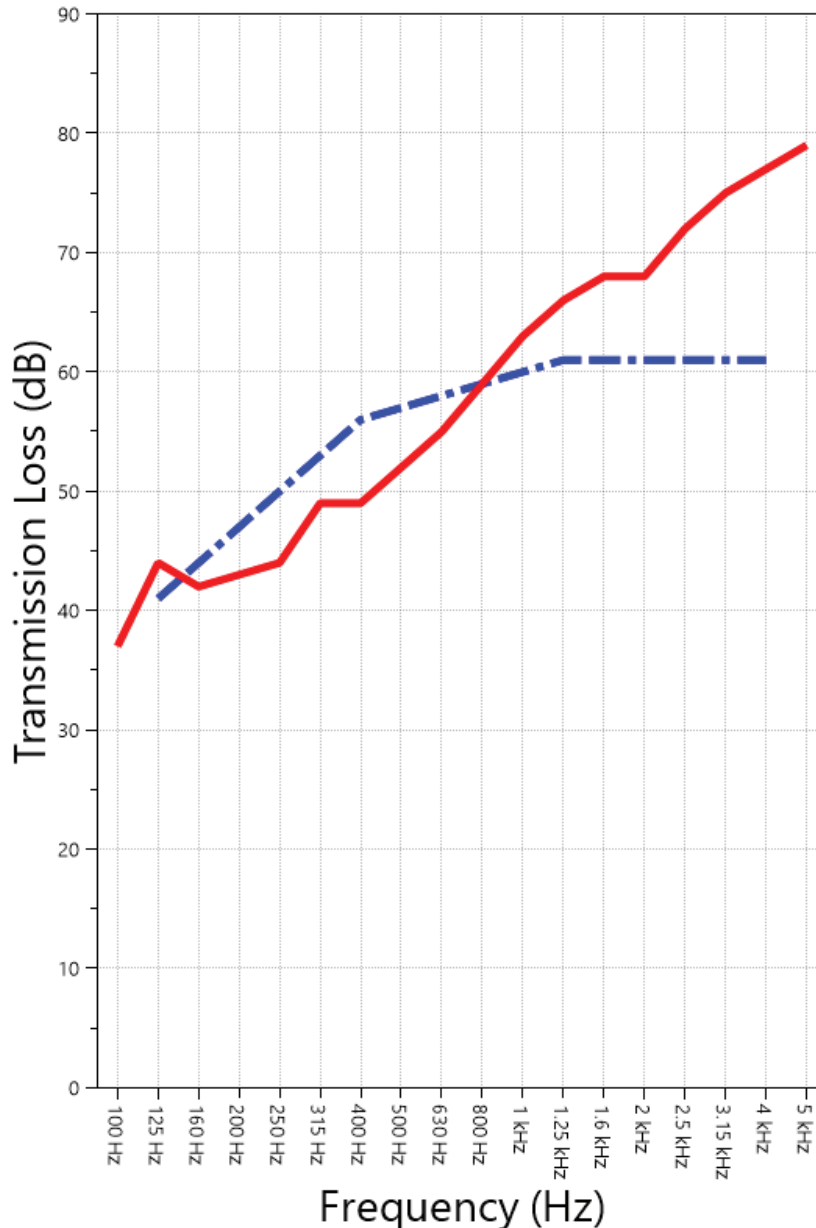
**Stauf USA LLC**  
 2021-02-16

**RAL™-TL21-066**

Page 8 of 11

**SOUND TRANSMISSION REPORT**

1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling



**STC=57**



**TRANSMISSION LOSS**  
**SOUND TRANSMISSION CLASS CONTOUR**



RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2017 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT.

THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.



1512 S BATAVIA AVENUE  
 GENEVA, IL 60134  
 630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
 WALLACE CLEMENT SABINE

Stauf USA LLC  
 2021-02-16

**RAL™-TL21-066**

Page 9 of 11

### **APPENDIX A: Extended Frequency Range Data**

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

*The following non-accredited data were obtained in accordance with ASTM E90-09 (2016), but extend beyond the defined frequency range of 100Hz to 5,000Hz. These unofficial results are representative of the RAL test environment only and intended for research & comparison purposes. Sampling precision observed during this procedure is reported below. Corrections are detailed in Appendix B.*

1/3 Octave Band Center Frequency (Hz)	Sound Transmission Loss (dB)	Applicable Corrections	ΔTL (Eq. A2.5) (dB)	Repeatability (dB)
31.5	35	ZZ F	1.20	5.61
40	33	ZZ F	1.38	1.09
50	31	ZZ F	0.94	0.97
63	33	ZZ F	1.13	0.71
80	38	ZZ F	0.48	0.72
100	37	ZZ F	0.61	1.90
125	44	ZZ F	0.54	0.85
160	42	Z F	0.61	1.16
200	43	ZZ F	0.31	0.94
250	44	Z F	0.23	2.47
315	49	Z F	0.24	1.39
400	49	Z F	0.33	3.10
500	52	Z	0.16	4.03
630	55	Z	0.21	2.86
800	59	Z F	0.21	1.27
1000	63	Z F	0.10	1.18
1250	66	Z F	0.17	1.73
1600	68	Z	0.23	0.86
2000	68	Z	0.20	0.90
2500	72	Z	0.15	0.96
3150	75		0.13	1.74
4000	77	A	0.18	2.80
5000	79	Z AA	0.45	2.43
6300	80	Z A F	0.50	1.96
8000	76	Z A F	0.21	1.98
10000	69	Z A F	0.24	1.56
12500	62	Z F	0.29	3.53



NVLAP LAB CODE 100227-0

RIVERBANK ACOUSTICAL LABORATORIES IS ACCREDITED BY NVLAP (LAB CODE 100227-0) FOR ACOUSTICAL TESTING SERVICES IN ACCORDANCE WITH ISO/IEC 17025:2017 AND FOR THIS PROCEDURE. THIS REPORT MUST NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY RAL, NVLAP, NIST, OR ANY AGENCY OF THE U.S. GOVERNMENT.

THIS REPORT SHALL NOT BE MODIFIED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR TESTING; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SAMPLE.

## Test Report

Stauf USA LLC  
2021-02-16

RAL™-TL21-066  
Page 10 of 11

### APPENDIX B: Glossary of Standardized Corrections and Adjustments

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

#### Mark Interpretation

- A* Measured sound pressure levels in the receive room are within 10 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.
- AA* Measured sound pressure levels in the receive room are within 5 dB of the ambient noise level at the marked frequency band. Receive room levels used to calculate Transmission Loss are corrected according to ASTM E90 Section 10.3.1. Transmission Loss values calculated from levels corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and a receive room with idealized ambient sound levels of  $(-\infty)$  dB.
- F* The reported Transmission Loss is within 10 dB of the laboratory flanking limit at the marked frequency band. The measured performance of the specimen may be limited by the performance of the laboratory building structure at this frequency band.
- Z* The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.7 to account for possible sound transmission through the filler assembly.
- ZZ* The reported Transmission Loss at the marked frequency band has been corrected according to ASTM E90 Section A3.2.8 to account for possible sound transmission through the filler assembly. Transmission Loss values corrected this way will be less than or equal to Transmission Loss values from a hypothetical test using the same specimen and an idealized filler assembly with a Sound Transmission Class rating of  $(\infty)$ .

### APPENDIX C: Glossary of Variability Metrics

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

$\Delta$ TL, the 95% confidence interval for reported transmission loss values, is calculated from the standard deviation of the sets of measurements for source room sound pressure level, receive room sound pressure level, and receive room sound absorption. This metric is calculated in an effort to quantify the combined influences of room geometry, microphone positioning, and other varying environmental conditions on reported results.

**Repeatability**, expressed as a 95% confidence interval, is calculated from the standard deviation of transmission loss as obtained from a set of six (6) consecutive tests conducted according to this test method by RAL on 2020-02-14. The tests were performed on a specimen composed of an insulated wood truss floor-ceiling assembly, using the same test opening as used in this report. This metric provides an estimate of the variation in results that might be observed if the test were repeated with no change to the installed specimen. Note that repeatability will vary with the construction type.

1512 S BATAVIA AVENUE  
GENEVA, IL 60134  
630-232-0104

An ALION Technical Center

RIVERBANK.ALIONSCIENCE.COM

## Test Report

FOUNDED 1918 BY  
WALLACE CLEMENT SABINE

Stauf USA LLC  
2021-02-16

**RAL™-TL21-066**

Page 11 of 11

### APPENDIX D: Instruments of Traceability

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

<u>Description</u>	<u>Model</u>	<u>Serial Number</u>	<u>Date of Certification</u>	<u>Calibration Due</u>
System 2	Type 3160-A-042	3160-106974	2020-08-13	2021-08-13
Bruel & Kjaer Mic And Preamp C	Type 4943-B-001	2311439	2020-04-07	2021-04-07
Bruel & Kjaer Pistonphone	Type 4228	2781248	2020-08-12	2021-08-12
EXTECH Hygro 662	SD700	A083662	2020-12-18	2021-12-18
EXTECH Hygro 663	SD700	A083663	2020-12-18	2021-12-18

### APPENDIX E: Revisions to Original Test Report

Specimen: 1/2 in. engineered hardwood floor with SMP920 troweled adhesive over 8 in. concrete slab, no ceiling (See Full Report)

<u>Date</u>	<u>Revision</u>
2021-02-18	Original report issued

---

END