

RIVERBANK ACOUSTICAL LABORATORIES

1512 S. BATAVIA AVENUE
GENEVA, ILLINOIS 60134

Alion Science and Technology

630/232-0104
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

TEST REPORT

FOR: Nucor / Vulcraft Group
Norfolk, NE.

Sound Absorption
RAL™-A14-186

CONDUCTED: 2014-08-21

Page 1 of 6

ON: 3.5 DA 20 ga. Perforated Metal Deck (Plastic Mesh) Insulated with 3.0 pcf Fiberglass - 2"
Poly ISO Backer

TEST METHOD

The test method conformed explicitly with the requirements of the ASTM Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method: ASTM C423-09a and E795-05. Riverbank Acoustical Laboratories has been accredited by the U.S. Department of Commerce, National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP) for this test procedure (NVLAP Lab Code: 100227-0). A description of the measuring procedure and room qualifications is available separately.

DESCRIPTION OF THE SPECIMEN

The test specimen was designated by the manufacturer as 3.5 DA 20 ga. Perforated Metal Deck (Plastic Mesh) Insulated with 3.0 pcf Fiberglass - 2" Poly ISO Backer. A visual inspection by Riverbank staff verified the manufacturer's description. The specimen consisted of a metal deck with perforations on the top of each flute. The thickness of the metal was measured as 0.94 mm (0.037 in.). The perforation specifications were as follows: 4.0 mm diameter round perforations at 60° staggered center pitch, 9.5 mm on center = 16.1% open area in the perforated region. Each flute was measured as 134.94 mm (5-5/16 in) wide (bottom), 182.56 mm (7-3/16 in) wide (top), and 88.90 mm (3.50 in.) thick. Inserted into each flute was 139.70 mm (5.50 in.) wide by 50.80 mm (2.0 in.) thick, rigid fiberglass insulation. A 165.10 mm (6.50 in.) wide by 2.54 mm (0.10 in.) thick, plastic mesh spacer was placed between the fiberglass insulation and the perforated region of the flute. The entire specimen was backed by 50.80 mm (2.0 in.) thick polyisocyanurate roof board (dense foam panels with reinforced felt facing).

The specimen consisted of 4 pieces laid as a single rectangular patch. The overall dimensions of the specimen as measured were 2.74 m (108.00 in.) wide by 2.44 m (96.00 in.) long and 139.70 mm (5.50 in.) thick. The area used in the calculations was 6.69 m² (72.00 ft²). The weight of the entire specimen as measured was 126.33 kg (278.50 lbs), an average of 18.90 kg/m² (3.87 lbs/ft²).

The specimen was tested in the laboratory's 292.0 m³ (10,311.0 ft³) test chamber. The room temperature at the time of the test was 22.4±0.1°C (72.4±0.1°F) and 59.1±0.3% relative humidity. The atmospheric pressure was 98.5 kPa.



NVLAP LAB CODE 100227-0

RAL IS ACCREDITED BY THE US DEPARTMENT OF COMMERCE, NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM FOR SPECIFIC ACOUSTICAL TEST METHODS. THE LABORATORY'S ACCREDITATION OR ANY OF ITS TEST REPORTS IN NO WAY CONSTITUTES OR IMPLIES PRODUCT CERTIFICATION, APPROVAL OR ENDORSEMENT BY NIST OR RAL. THIS REPORT SHALL NOT BE MODIFIED OR PARTIALLY REPRODUCED WITHOUT THE WRITTEN APPROVAL OF RAL.

THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR MEASUREMENT; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SPECIMEN.

RIVERBANK ACOUSTICAL LABORATORIES

1512 S. BATAVIA AVENUE
GENEVA, ILLINOIS 60134

Alion Science and Technology

630/232-0104
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

TEST REPORT

Nucor / Vulcraft Group
2014-08-21

RAL™-A14-186
Page 2 of 6



Figure 1 - Specimen mounted in the test chamber.



Figure 2 - Detail of the test specimen.



NVLAP LAB CODE 100227-0

RAL IS ACCREDITED BY THE US DEPARTMENT OF COMMERCE, NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM FOR SPECIFIC ACOUSTICAL TEST METHODS. THE LABORATORY'S ACCREDITATION OR ANY OF ITS TEST REPORTS IN NO WAY CONSTITUTES OR IMPLIES PRODUCT CERTIFICATION, APPROVAL OR ENDORSEMENT BY NIST OR RAL. THIS REPORT SHALL NOT BE MODIFIED OR PARTIALLY REPRODUCED WITHOUT THE WRITTEN APPROVAL OF RAL.

THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR MEASUREMENT; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SPECIMEN.

RIVERBANK ACOUSTICAL LABORATORIES

1512 S. BATAVIA AVENUE
GENEVA, ILLINOIS 60134

Alion Science and Technology

630/232-0104
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

TEST REPORT

Nucor / Vulcraft Group
2014-08-21

RAL™-A14-186
Page 3 of 6

MOUNTING A

The test specimen was laid directly against the test surface. The perimeter was sealed using wood and metal framing.

TEST RESULTS

1/3 Octave Center Frequency (Hz)	Absorption Coefficient	Total Absorption In Sabins
100	0.18	12.72
** 125	0.25	18.23
160	0.34	24.56
200	0.54	39.24
** 250	0.74	53.47
315	1.00	72.10
400	1.14	82.04
** 500	1.13	81.44
630	1.02	73.35
800	1.04	74.79
** 1000	1.06	76.00
1250	0.99	71.59
1600	1.00	72.07
** 2000	0.97	69.97
2500	0.89	64.32
3150	0.79	56.78
** 4000	0.75	54.09
5000	0.66	47.60

SAA = 0.96
NRC = 1.00



NVLAP LAB CODE 100227-0

RAL IS ACCREDITED BY THE US DEPARTMENT OF COMMERCE, NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM FOR SPECIFIC ACOUSTICAL TEST METHODS. THE LABORATORY'S ACCREDITATION OR ANY OF ITS TEST REPORTS IN NO WAY CONSTITUTES OR IMPLIES PRODUCT CERTIFICATION, APPROVAL OR ENDORSEMENT BY NIST OR RAL. THIS REPORT SHALL NOT BE MODIFIED OR PARTIALLY REPRODUCED WITHOUT THE WRITTEN APPROVAL OF RAL.

THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR MEASUREMENT; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SPECIMEN.

RIVERBANK ACOUSTICAL LABORATORIES

1512 S. BATAVIA AVENUE
GENEVA, ILLINOIS 60134

Alion Science and Technology

630/232-0104
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

TEST REPORT

Nucor / Vulcraft Group
2014-08-21

RAL™-A14-186
Page 4 of 6

TEST RESULTS (Continued)

The sound absorption average (SAA) is defined as a single number rating, the average, rounded to the nearest 0.01, of the sound absorption coefficient of a material for the twelve one-third octave bands from 200 through 2500 Hz, inclusive.

The noise reduction coefficient (NRC) is defined from previous versions of this same test method as the average of the coefficients at 250, 500, 1000, and 2000 Hz, expressed to the nearest integral multiple of 0.05.

Tested by Marc Sciaky
Marc Sciaky
Experimentalist

Report by Chris Nottoli
Chris Nottoli
Acoustician

Approved by Eric P. Wolfram
Eric P. Wolfram
Laboratory Manager



NVLAP LAB CODE 100227-0

RAL IS ACCREDITED BY THE US DEPARTMENT OF COMMERCE, NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM FOR SPECIFIC ACOUSTICAL TEST METHODS. THE LABORATORY'S ACCREDITATION OR ANY OF ITS TEST REPORTS IN NO WAY CONSTITUTES OR IMPLIES PRODUCT CERTIFICATION, APPROVAL OR ENDORSEMENT BY NIST OR RAL. THIS REPORT SHALL NOT BE MODIFIED OR PARTIALLY REPRODUCED WITHOUT THE WRITTEN APPROVAL OF RAL.

THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR MEASUREMENT; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SPECIMEN.

RIVERBANK ACOUSTICAL LABORATORIES

1512 S. BATAVIA AVENUE
GENEVA, ILLINOIS 60134

Alion Science and Technology

630/232-0104
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

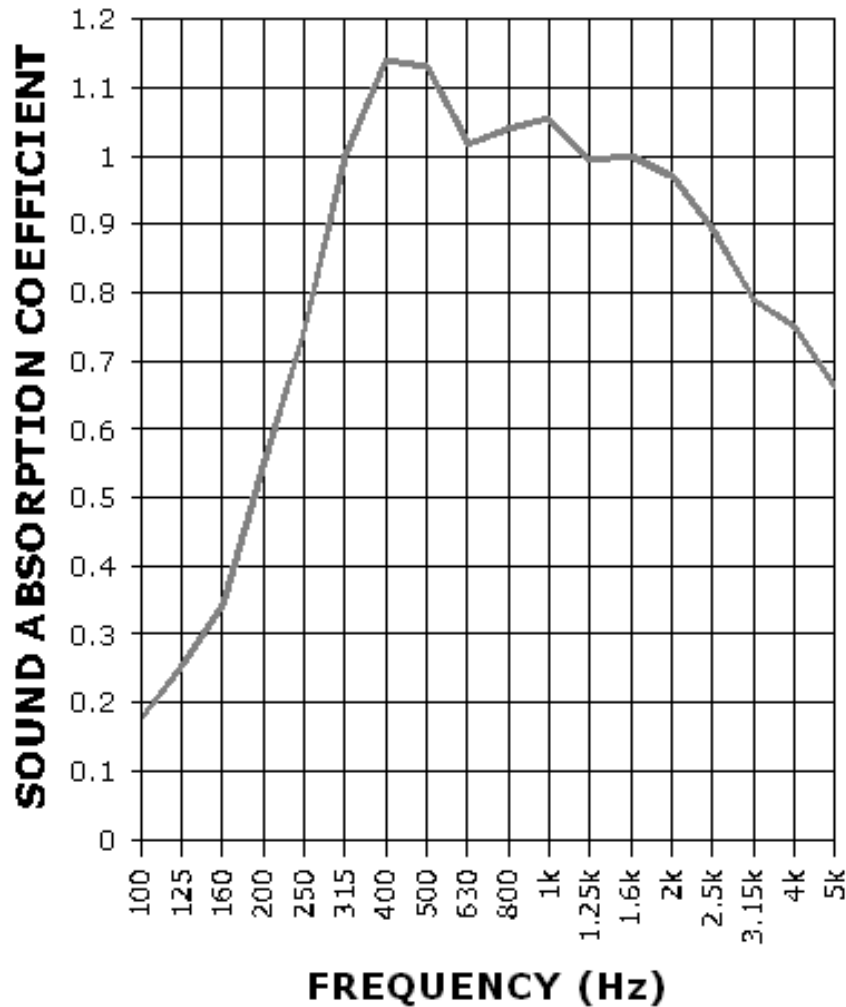
TEST REPORT

Nucor / Vulcraft Group
2014-08-21

RAL™-A14-186
Page 5 of 6

SOUND ABSORPTION REPORT

3.5 DA 20 ga. Perforated Metal Deck (Plastic Mesh) Insulated with 3.0 pcf
Fiberglass - 2" Poly ISO Backer



SAA = 0.96

NRC = 1.00



NVLAP LAB CODE 100227-0

RAL IS ACCREDITED BY THE US DEPARTMENT OF COMMERCE, NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM FOR SPECIFIC ACOUSTICAL TEST METHODS. THE LABORATORY'S ACCREDITATION OR ANY OF ITS TEST REPORTS IN NO WAY CONSTITUTES OR IMPLIES PRODUCT CERTIFICATION, APPROVAL OR ENDORSEMENT BY NIST OR RAL. THIS REPORT SHALL NOT BE MODIFIED OR PARTIALLY REPRODUCED WITHOUT THE WRITTEN APPROVAL OF RAL.

THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR MEASUREMENT; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SPECIMEN.

RIVERBANK ACOUSTICAL LABORATORIES

1512 S. BATAVIA AVENUE
GENEVA, ILLINOIS 60134

Alion Science and Technology

630/232-0104
FOUNDED 1918 BY
WALLACE CLEMENT SABINE

TEST REPORT

Nucor / Vulcraft Group
2014-08-21

RAL™-A14-186
Page 6 of 6

Appendix to ASTM C423 Sound Absorption Test **Extended Frequency Range Data**

Product Description: 3.5 DA 20 ga. Perforated Metal Deck (Plastic Mesh) Insulated with 3.0 pcf Fiberglass - 2" Poly ISO Backer (See Full Report)

Riverbank Acoustical Laboratories is accredited to perform sound absorption coefficient measurements for the frequency range of 100Hz to 5,000Hz. However, we calculate sound absorption values at additional test frequencies as a service to our clients.

Although these measurements were made in accordance with the procedures described in ASTM C423-09a, they do not qualify as part of the standard. Since the results are representative of the test environment only, they are unofficial and intended for research and development guidelines rather than for commercial purposes. The sound absorption values at additional frequencies were as follows:

RAL-A14-186

1/3 Octave Center Frequency (Hz)	<u>Absorption Coefficient</u>	<u>Total Absorption</u> (Sabins)
40	0.01	0.98
50	-0.06	-4.08
63	0.06	4.59
80	-0.03	-1.81
6300	0.57	40.93
8000	0.40	28.91
10000	0.30	21.85

END



NVLAP LAB CODE 100227-0

RAL IS ACCREDITED BY THE US DEPARTMENT OF COMMERCE, NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM FOR SPECIFIC ACOUSTICAL TEST METHODS. THE LABORATORY'S ACCREDITATION OR ANY OF ITS TEST REPORTS IN NO WAY CONSTITUTES OR IMPLIES PRODUCT CERTIFICATION, APPROVAL OR ENDORSEMENT BY NIST OR RAL. THIS REPORT SHALL NOT BE MODIFIED OR PARTIALLY REPRODUCED WITHOUT THE WRITTEN APPROVAL OF RAL. THE RESULTS REPORTED APPLY ONLY TO THE SPECIFIC SAMPLE SUBMITTED FOR MEASUREMENT; RAL ASSUMES NO RESPONSIBILITY FOR THE PERFORMANCE OF ANY OTHER SPECIMEN.