# REPORT

FOR THE SCOPE OF
ACCREDITATION UNDER NVLAP
LAB CODE 100402-0.

**3933 US ROUTE 11 CORTLAND, NEW YORK 13045**

Order No. 100323251 Date: March 14, 2011

**REPORT NO. 100323251CRT-001**

**SILENCER INSERTION LOSS WITH AND WITHOUT AIRFLOW AND AIRFLOW GENERATED SOUND TESTS ON A 2 FOOT LONG 24x24 INCH SILENCER**

**RENDERED TO**

**FAISAL JASSIM TRADING CO LLC**
**PO BOX 1871**
**DUBAI**

## INTRODUCTION

This report gives the Insertion Loss in dB and generated sound power level ($L_W$) dB re $10^{-12}$ watt in relation to a given airflow in fpm on a 2 foot long 24x24 inch silencer. The silencer was selected and supplied by the client and was received at the laboratories on February 14, 2011. The silencer appeared to be in new, unused condition upon arrival.

## AUTHORIZATION

Signed Intertek Quotation No. 500271923.

## TEST METHOD

The laboratory method used in conducting these tests is in accordance with ASTM Standard E477-06a, entitled "Standard Method of Testing Duct Liner Materials and Prefabricated Silencers for Acoustical and Airflow Performance".

Sound pressure level data was obtained using a Bruel and Kjaer Digital Frequency Analyzer Type 2131 and the data analysis was completed using a Compaq ProLinea 4/33 Computer and Epson LQ-850 Printer. The reference sound source used to obtain the generated sound power level was a calibrated Bruel & Kjaer Type 4204, which conforms to the above standard.

**Note:** *The results contained herein are for technical evaluation only and are applicable only to the specific specimens referenced herein.*
*The tests herein reported have not been performed at the request of AMCA International and is not part of the AMCA International Certification Program*

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**TEST METHOD** - Cont'd

The Intertek 16,640 cu. ft. (470 cubic meters) reverberation room is qualified in accordance with ANSI S12.31 and S12.32 for sound measurement from 100 to 10,000 hertz.

The following notes relate to the data submitted in the data pages.

Note: Sound power level data denoted with an asterisk has reached ambient levels in the test room or is determined by instrument limitations. Actual levels are less than or equal to the levels indicated. The generated sound data has been corrected for end reflection.

Note: Insertion loss data denoted with a (>) sign has been corrected to take into consideration the effect of the generated sound pressure level approaching the sound pressure level obtained during the insertion loss portion of the test. In some cases, the insertion loss may be higher than shown.

**DESCRIPTION OF TEST SPECIMEN**

2 FOOT LONG 24x24 INCH SILENCER
The sample was a 24 inch long silencer which measured 24 inches wide by 24 inches high with two side absorbers and one center absorber. The absorbers were filled. The silencer casing was constructed from galvanized solid steel and the absorbers consisted of perforated galvanized steel with 3/32 inch diameter holes spaced on 3/16 inch staggered centers. The side baffles were 5 3/4 inches thick and the center baffle was 4 ½ inches thick at the solid rounded entrance. The baffles continued straight to a squared exit. The silencer had an open area of 33% at the inlet and exit. The silencer weighed 76.5 pounds.

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## RESULTS OF MEASUREMENTS

### 2 FOOT LONG 24x24 INCH SILENCER FORWARD FLOW

| Insertion Loss | | | | | Generated Sound Power | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0 Flow | Flow 1 | Flow 2 | Flow 3 | | Flow 1 | | Flow 2 | Flow 3 |
| Frequency | | 750 | 1500 | 2000 | | 750 | | 1500 | 2000 |
| 63 | 1 | 0 | 1 | 0 | 63 | 56 | ** | 72 | 74 |
| 125 | 5 | 5 | 5 | 5 | 125 | 50 | | 66 | 75 |
| 250 | 9 | 9 | 9 | 8 | 250 | 47 | | 61 | 70 |
| 500 | 17 | 16 | 16 | 15 | 500 | 49 | | 60 | 67 |
| 1000 | 19 | 18 | 18 | 17 | 1000 | 49 | | 61 | 67 |
| 2000 | 17 | 17 | 17 | 17 | 2000 | 46 | | 62 | 68 |
| 4000 | 15 | 14 | 14 | 14 | 4000 | 39 | | 60 | 68 |
| 8000 | 12 | 12 | 12 | 12 | 8000 | 27 | ** | 53 | 62 |

| Insertion Loss | | | | | Generated Sound Power | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0 Flow | Flow 1 | Flow 2 | Flow 3 | | Flow 1 | | Flow 2 | Flow 3 |
| | | 750 | 1500 | 2000 | | 750 | | 1500 | 2000 |
| 50 | 0 | -1 | 1 | -1 | 50 | 53 | ** | 61 | 70 |
| 63 | 0 | -1 | 0 | -1 | 63 | 50 | ** | 71 | 67 |
| 80 | 3 | 3 | 4 | 3 | 80 | 48 | * | 65 | 69 |
| 100 | 4 | 4 | 5 | 4 | 100 | 46 | | 59 | 74 |
| 125 | 5 | 4 | 5 | 4 | 125 | 46 | | 64 | 67 |
| 160 | 7 | 7 | 7 | 6 | 160 | 43 | | 58 | 65 |
| 200 | 7 | 8 | 8 | 7 | 200 | 43 | | 57 | 68 |
| 250 | 9 | 9 | 9 | 8 | 250 | 42 | | 55 | 62 |
| 315 | 11 | 11 | 11 | 10 | 315 | 42 | | 56 | 64 |
| 400 | 15 | 14 | 14 | 13 | 400 | 44 | | 56 | 63 |
| 500 | 17 | 17 | 16 | 16 | 500 | 45 | | 56 | 62 |
| 630 | 19 | 19 | 18 | 17 | 630 | 44 | | 55 | 62 |
| 800 | 20 | 19 | 18 | 17 | 800 | 43 | | 56 | 61 |
| 1000 | 19 | 19 | 18 | 18 | 1000 | 44 | | 57 | 62 |
| 1250 | 18 | 17 | 17 | 16 | 1250 | 44 | | 57 | 63 |
| 1600 | 19 | 18 | 18 | 17 | 1600 | 42 | | 57 | 63 |
| 2000 | 17 | 17 | 16 | 16 | 2000 | 41 | | 57 | 63 |
| 2500 | 16 | 16 | 16 | 16 | 2500 | 40 | | 58 | 65 |
| 3150 | 16 | 16 | 16 | 15 | 3150 | 37 | | 57 | 64 |
| 4000 | 15 | 15 | 15 | 15 | 4000 | 33 | | 55 | 63 |
| 5000 | 13 | 13 | 13 | 13 | 5000 | 29 | | 53 | 62 |
| 6300 | 13 | 13 | 12 | 12 | 6300 | 25 | * | 50 | 59 |
| 8000 | 12 | 12 | 12 | 12 | 8000 | 21 | * | 47 | 56 |
| 10000 | 12 | 12 | 12 | 12 | 10000 | 21 | ** | 44 | 54 |

| Flow | FPM | Static Pressure | |
|---|---|---|---|
| 1 | 750 | 0.25 | iwg |
| 2 | 1500 | 0.95 | iwg |
| 3 | 2000 | 1.66 | iwg |

Sound power levels are in dB referenced $10^{-12}$ Watts.
The Insertion Loss (IL) is in dB.
The Face Velocity is in fpm.

**RESULTS OF MEASUREMENTS** (cont'd)

## 2 FOOT LONG 24x24 INCH SILENCER REVERSE FLOW

Insertion Loss

| Frequency | 0 Flow | Flow 1 750 | Flow 2 1500 | Flow 3 2000 | |
|---|---|---|---|---|---|
| 63 | 1 | 2 | 2 | 3 | |
| 125 | 5 | 6 | 6 | 7 | |
| 250 | 10 | 11 | 11 | 12 | |
| 500 | 17 | 18 | 18 | 18 | |
| 1000 | 19 | 19 | 19 | 19 | < |
| 2000 | 18 | 18 | 18 | 18 | |
| 4000 | 15 | 16 | 15 | 15 | |
| 8000 | 13 | 13 | 13 | 13 | |

Generated Sound Power

| | Flow 1 750 | | Flow 2 1500 | Flow 3 2000 |
|---|---|---|---|---|
| 63 | 58 | * | 76 | 82 |
| 125 | 52 | | 69 | 80 |
| 250 | 50 | | 63 | 67 |
| 500 | 51 | | 64 | 68 |
| 1000 | 48 | | 65 | 69 |
| 2000 | 41 | | 64 | 69 |
| 4000 | 34 | * | 59 | 69 |
| 8000 | 25 | ** | 50 | 59 |

Insertion Loss

| | 0 Flow | Flow 1 750 | Flow 2 1500 | Flow 3 2000 | |
|---|---|---|---|---|---|
| 50 | 1 | 1 | 2 | 3 | |
| 63 | 0 | 1 | 0 | 1 | |
| 80 | 4 | 4 | 3 | 4 | |
| 100 | 4 | 5 | 5 | 5 | |
| 125 | 5 | 6 | 6 | 6 | |
| 160 | 8 | 9 | 8 | 10 | |
| 200 | 9 | 9 | 10 | 10 | |
| 250 | 9 | 10 | 11 | 11 | |
| 315 | 12 | 13 | 13 | 14 | |
| 400 | 15 | 16 | 16 | 17 | |
| 500 | 17 | 18 | 18 | 18 | |
| 630 | 20 | 20 | 21 | 22 | |
| 800 | 20 | 20 | 21 | 21 | < |
| 1000 | 19 | 19 | 19 | 19 | |
| 1250 | 18 | 18 | 19 | 18 | |
| 1600 | 19 | 20 | 20 | 20 | |
| 2000 | 18 | 18 | 19 | 19 | |
| 2500 | 17 | 16 | 17 | 17 | |
| 3150 | 16 | 16 | 16 | 16 | |
| 4000 | 15 | 16 | 15 | 15 | |
| 5000 | 14 | 15 | 14 | 14 | |
| 6300 | 13 | 14 | 14 | 14 | |
| 8000 | 13 | 12 | 12 | 12 | |
| 10000 | 13 | 13 | 13 | 13 | |

Generated Sound Power

| | Flow 1 750 | | Flow 2 1500 | Flow 3 2000 |
|---|---|---|---|---|
| 50 | 56 | * | 67 | 71 |
| 63 | 54 | * | 75 | 69 |
| 80 | 47 | * | 64 | 81 |
| 100 | 48 | | 64 | 80 |
| 125 | 49 | | 67 | 67 |
| 160 | 45 | | 58 | 66 |
| 200 | 46 | | 58 | 63 |
| 250 | 44 | | 57 | 61 |
| 315 | 46 | | 59 | 62 |
| 400 | 46 | | 60 | 62 |
| 500 | 46 | | 60 | 63 |
| 630 | 45 | | 59 | 63 |
| 800 | 45 | | 59 | 64 |
| 1000 | 44 | | 60 | 64 |
| 1250 | 41 | | 60 | 65 |
| 1600 | 38 | | 59 | 63 |
| 2000 | 36 | | 60 | 64 |
| 2500 | 34 | | 60 | 66 |
| 3150 | 32 | | 57 | 66 |
| 4000 | 28 | | 53 | 64 |
| 5000 | 24 | * | 50 | 61 |
| 6300 | 21 | * | 47 | 57 |
| 8000 | 20 | ** | 44 | 54 |
| 10000 | 21 | ** | 41 | 52 |

| Flow | FPM | Static Pressure | |
|---|---|---|---|
| 1 | 750 | 0.25 | iwg |
| 2 | 1500 | 0.95 | iwg |
| 3 | 2000 | 1.66 | iwg |

Sound power levels are in dB referenced $10^{-12}$ Watts.
The Insertion Loss (IL) is in dB.
The Face Velocity is in fpm.

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## REMARKS

Ambient Temperature: 69º F
Relative Humidity: 19%
Barometric Pressure: 29.42 in. Hg

## CONCLUSION

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

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

Date of Tests: March 11, 2011

Report Approved by:

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Attachments: None