



E9560.01-113-11-R0
ACOUSTICAL PERFORMANCE TEST REPORT

Rendered to

United Plastics Corporation

Specimen Type: Duct Lagging Material

Duct Type: 24" by 12" Metal Ductwork (20 Gauge)

Frequency (Hz)	Test A	Test B
	dB QuietDuc	dB QuietDuc with R6 Insulation
315	3	12
400	5	15
500	6	18
630	9	20
800	11	21
1000	12	24
1250	14	24
1600	16	25
2000	18	26
2500	21	28
3150	24	29
4000	27	31
5000	26	32

Reference should be made to Intertek-ATI Report No. E9560.01-113-11 for complete test specimen description. This page alone is not a complete report.



Acoustical Performance Test Report

Rendered to:

UNITED PLASTICS CORPORATION
511 Hay Street
Mount Airy, North Carolina 27030

Report No	E9560.01-113-11
Test Date	07/21/15
Report Date	08/07/15

Project Scope

Architectural Testing, Inc., a subsidiary of Intertek ("Intertek-ATI"), was contracted to conduct insertion loss tests. The complete test data is included as Appendix B of this report. The client provided the test specimen.

Test Methods

Testing for this project was conducted in accordance with the following standards with the exception of the 12" pipe. The equipment listed in the attachments meets the requirements of ASTM E 1222-90 (Reapproved 2009), *Standard Test Method for Laboratory Measurement of the Insertion Loss of Pipe Lagging Systems*.

Test Procedure

The pipe insertion test apparatus was assembled in Intertek-ATI located in York, Pennsylvania. The sensitivity of the microphones was checked before measurements were conducted.

One background noise sound pressure level measurement was conducted at each of the five microphone positions. With the noise source turned on inside the duct, sound pressure level measurements were made simultaneously in the receiving room at each of the five microphone positions and inside the Duct at one position. With the reference sound source on, sound pressure level measurements were made in the receive room at each of the five microphone positions. The air temperature and relative humidity conditions were monitored and recorded during all measurements.

Test Apparatus Description

The total length of the duct was 20'. The length of the duct exposed to the reverberation room was 184". Both ends of the duct terminated on the exterior side of the reverberation room walls. A detailed description of the duct is located in the Specimen Descriptions section of this report. A rubber isolation boot was installed on to the east end of the duct. A 10" loudspeaker was installed into the rubber isolation boot. A high TL enclosure was placed over the loudspeaker. The west end of the duct was inserted into an anechoic termination outside of the chamber. The perimeter of the duct was sealed with duct seal at the interior and exterior walls and anechoic termination.

Specimen Descriptions

Duct

Type	20 Gauge
Duct Material	Steel
Nominal Interior Diameter	12" by 24"
Exposed Length	185"

Option A

Series/Model	dB QuietDuc
Average Overall Thickness	0.197"
Weight Per Square Foot	1.080 lbs
Fasteners	NONE
Circumferential Joint Overlap	5"
Longitudinal Joint Overlap	3"
Notes	Four pieces of material were cut to 46" by 48", wrapped around the Duct with seams overlapping, and sealed with tape.

Option B

Series/Model	dB QuietDuc with R6 Insulation
Average Overall Thickness	1.697"
Weight Per Square Foot	1.2 lbs
Fasteners	NONE
Circumferential Joint Overlap	5"
Longitudinal Joint Overlap	3"
Notes	Eight pieces of material were cut to 46" by 48", wrapped around the Duct with seams overlapping, and sealed with tape

N/A - Non Applicable

Comments

The client did not supply a report drawing of the test specimen. Intertek-ATI will store samples of test specimens for four years. Photographs of the test specimen are included in Appendix C.



Intertek-ATI 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 Intertek-ATI for the entire test record retention period. The test record retention period ends four years after the test date.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimen tested. This report is intended to help in the client's quality assurance program, but it does not represent a continuous or exhaustive evaluation of the specimen tested or of other products or materials that were not evaluated. The statements and data provided herein do not constitute approval, disapproval, certification, or acceptance of performance or materials.

This report may not be reproduced, except in full, without the written approval of Intertek-ATI.

For INTERTEK-ATI:

Leeland S. Hoover
Technician II - Acoustical Testing

Bradley D. Hunt
Project Manager – Acoustical Testing

LSH:jmcs

Attachments (pages): This report is complete only when all attachments listed are included.

- Appendix-A: Equipment description (1)
- Appendix-B: Complete test results (4)
- Appendix-C: Photographs (1)



Revision Log

<u>Rev. #</u>	<u>Date</u>	<u>Page(s)</u>	<u>Revision(s)</u>
R0	08/07/15	N/A	Original Report Issue



E9590.01-113-11

Attachments

Instrumentation

Instrument	Manufacturer	Model	ATI Number	Date of Calibration
Data Acquisition Unit	National Instruments	PXI-1033	63763	06/14 *
Microphone Calibrator	Norsonic	1251	65105	04/15
Receive Room Microphone	PCB Piezotronics	378B20	63748	05/15
Receive Room Microphone	PCB Piezotronics	378B20	63744	05/15
Receive Room Microphone	PCB Piezotronics	378B20	63745	05/15
Receive Room Microphone	PCB Piezotronics	378B20	63746	05/15
Receive Room Microphone	PCB Piezotronics	378B20	63747	05/15
Receive Room Environmental Indicator	Comet	T7510	63810	09/14
Source Room Microphone	PCB Piezotronics	378B20	63738	04/15
Source Room Microphone	PCB Piezotronics	378B20	63739	04/15
Source Room Microphone	PCB Piezotronics	378B20	63740	04/15
Source Room Microphone	PCB Piezotronics	378B20	63742	04/15
Source Room Microphone	PCB Piezotronics	378B20	63741	04/15
Source Room Environmental Indicator	Comet	T7510	63811	09/14



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Appendix B
Complete Test Results



**INSERTION LOSS
OF PIPE LAGGING SYSTEMS**
ASTM E 1222

Test Date	07/21/15
ATI No.	E5960.01A
Client	United Plastics Corporation
Pipe Description	12" by 24" Duct (20 Gauge)
Material Description	dB QuietDuc
Operator	Leeland S. Hoover

Temperature	24 °C
Relative Humidity	68 %

Frequency (Hz)	Bare Pipe		Lagged Pipe		Insertion Loss (dB)
	L _b (dB)	L _{b,r} (dB)	L _I (dB)	L _{I,r} (dB)	
100	77.9	63.2	73.4	63.8	5
125	77.2	64.5	71.8	64.5	5
160	80.8	66.3	73.7	66.9	8
200	84.8	66.0	80.2	65.9	5
250	86.3	65.4	82.8	65.6	4
315	83.0	67.0	79.0	66.5	3
400	82.1	68.2	77.1	67.8	5
500	80.6	67.7	74.9	67.6	6
630	80.1	68.2	71.4	68.4	9
800	81.7	68.9	70.7	69.0	11
1000	76.7	70.3	64.8	70.5	12
1250	75.0	71.1	61.7	71.5	14
1600	76.0	71.4	59.9	71.7	16
2000	70.8	70.3	53.2	70.4	18
2500	68.5	68.3	47.5	68.4	21
3150	63.3	67.4	39.7	67.5	24
4000	59.8	66.5	33.4	66.6	27
5000	59.0	65.8	32.8	65.7	26
6300	52.5	64.1	21.1	64.1	31
8000	48.5	61.1	12.9	61.1	36
10000	45.1	56.5	9.4	56.4	36

- L_b** Average sound pressure level with sound radiating from the bare pipe
- L_{b,r}** Average sound pressure level with reference sound source and bare pipe
- L_I** Average sound pressure level with sound radiating from the lagged pipe
- L_{I,r}** Average sound pressure level with reference sound source and bare pipe
- IL** Insertion Loss; $IL = L_b - L_I - [L_{b,r} - L_{I,r}]$

ATI 00618 Revised 12/11/12

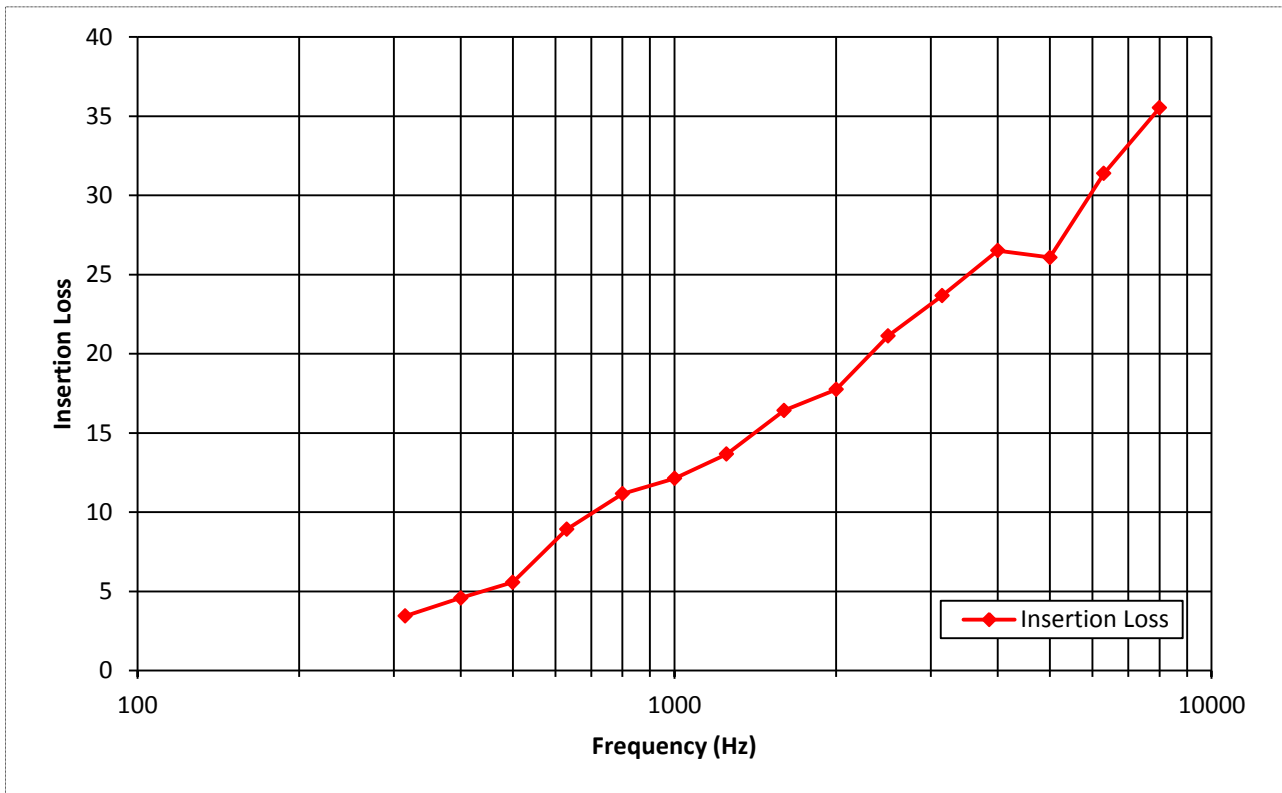


Architectural Testing

INSERTION LOSS OF PIPE LAGGING SYSTEMS ASTM E 1222

Test Date	07/21/15
ATI No.	E5960.01A
Client	United Plastics Corporation
Pipe Description	12" by 24" Duct (20 Gauge)
Material Description	dB QuietDuc
Operator	Leeland S. Hoover

Temperature	24 °C
Relative Humidity	68 %



ATI 00618 Revised 12/11/12



**INSERTION LOSS
OF PIPE LAGGING SYSTEMS**
ASTM E 1222

Test Date	07/21/15
ATI No.	E5960.01B
Client	United Plastics Corporation
Pipe Description	12" by 24" Duct (20 Gauge)
Material Description	dB QuietDuc & R6 Insulation
Operator	Leeland S. Hoover

Temperature	23.3 °C
Relative Humidity	62.5 %

Frequency (Hz)	Bare Pipe		Lagged Pipe		Insertion Loss (dB)
	L _b (dB)	L _{b,r} (dB)	L _l (dB)	L _{l,r} (dB)	
100	78.7	63.7	71.9	63.3	6
125	77.0	65.0	72.9	64.3	3
160	77.8	66.5	69.3	66.0	8
200	84.6	65.5	75.6	65.7	9
250	85.7	65.4	74.3	65.6	12
315	81.5	66.5	69.8	66.8	12
400	81.5	67.9	67.0	68.1	15
500	79.9	67.4	62.9	67.9	18
630	79.8	68.3	60.0	68.5	20
800	81.4	68.8	60.6	69.2	21
1000	76.8	70.3	53.3	70.7	24
1250	75.3	71.3	51.7	71.6	24
1600	76.0	71.3	51.4	71.9	25
2000	70.8	70.4	45.3	70.6	26
2500	68.5	68.3	41.2	68.6	28
3150	63.4	67.4	35.1	67.7	29
4000	59.7	66.5	29.1	66.7	31
5000	59.1	65.7	27.4	65.8	32
6300	52.4	64.0	16.3	64.0	36
8000	47.9	61.0	10.5	61.0	37
10000	44.4	56.3	8.6	56.2	36

- L_b** Average sound pressure level with sound radiating from the bare pipe
- L_{b,r}** Average sound pressure level with reference sound source and bare pipe
- L_l** Average sound pressure level with sound radiating from the lagged pipe
- L_{l,r}** Average sound pressure level with reference sound source and bare pipe
- IL** Insertion Loss; $IL = L_b - L_l - [L_{b,r} - L_{l,r}]$

ATI 00618 Revised 12/11/12

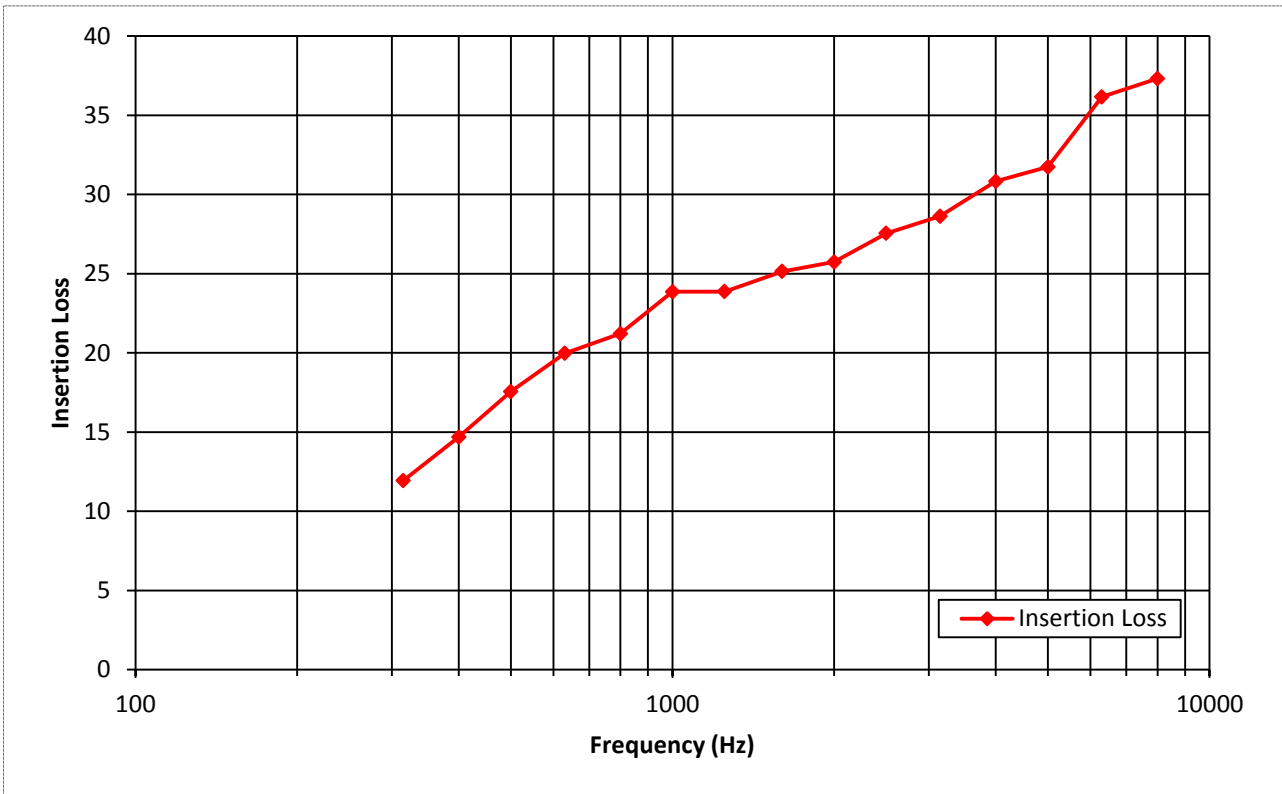


Architectural Testing

INSERTION LOSS OF PIPE LAGGING SYSTEMS ASTM E 1222

Test Date	07/21/15
ATI No.	E5960.01B
Client	United Plastics Corporation
Pipe Description	12" by 24" Duct (20 Gauge)
Material Description	dB QuietDuc & R6 Insulation
Operator	Leeland S. Hoover

Temperature	23.3 °C
Relative Humidity	62.5 %



ATI 00618 Revised 12/11/12

Appendix C

Photographs



View of Test Setup (Lagged)



View of Test Setup (Bare)