

# DONGWON INDUSTRY USA LLC ACOUSTICAL PERFORMANCE TEST REPORT

## **SCOPE OF WORK**

ASTM C423 SOUND ABSORPTION TESTING ON ROLLER SHADE SCREEN FABRIC

## **REPORT NUMBER**

L0012.01-113-11-R0

## **TEST DATE**

05/29/20

## **ISSUE DATE**

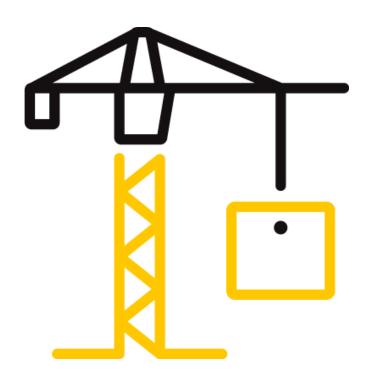
06/12/20

# **PAGES**

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## **DOCUMENT CONTROL NUMBER**

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#### TEST REPORT FOR DONGWON INDUSTRY USA LLC

Report No.: L0012.01-113-11-R0

Date: 06/12/20

REPORT ISSUED TO DONGWON INDUSTRY USA LLC

80 Industrial Road, Suite D Lodi, New Jersey 07644

## **SECTION 1**

## **SCOPE**

Intertek Building & Construction (B&C) was contracted by DongWon Industry USA LLC to perform a sound absorption test. Results obtained are tested values and were secured by using the designated test methods. The complete test data is included herein. The client provided the test specimen. All measurements were conducted in the HT test chambers at Intertek B&C located in York, Pennsylvania.

This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. Intertek B&C will service this report for the entire test record retention period. The test record retention period ends four years after the test date. Test records, such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation, will be retained for the entire test record retention period.

## For INTERTEK B&C:

Zachary P. Golden Todd D. Kister **COMPLETED BY: REVIEWED BY:** Technician Team Leader Laboratory Manager TITLE: **Acoustical Testing** TITLE: **Acoustical Testing SIGNATURE: SIGNATURE: DATE:** 06/12/20 DATE: 06/12/20

ZPG:jmcs

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# **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

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## **SECTION 2**

#### **SUMMARY OF TEST RESULTS**

SAMPLE TYPE	Roller shade screen fabric
MOUNTING TYPE	G

DECRIPTION	<b>J</b>	30DN 1%	30DN 1%					
DATA FILE NO.	OCTAVE E	FAVE SOUND ABSORPTION COEFFICIENTS AT THE E BAND FREQUENCIES					NRC	SAA
	125	250   500   1000   2000   4000						
L0012.01A	0.00	0.16	.16 0.57 0.82 0.63 0.54					0.56

DECRIPTION	J	30DN 3%	30DN 3%					
DATA FILE	OCTAVE BAND FREQUENCIES					NRC	SAA	
	125	250   500   1000   2000   4000						
L0012.01B	0.00	0.04	0.10	0.29	0.20	0.20	0.15	0.17

DECRIPTION	١	30DN 5%	30DN 5%					
DATA FILE NO.	OCTAVE E	AVE SOUND ABSORPTION COEFFICIENTS AT THE BAND FREQUENCIES					NRC	SAA
	125	250 500 1000 2000 4000						
L0012.01C	0.00	0.02	0.07	0.20	0.13	0.16	0.10	0.11

DECRIPTION	J	30DN 10%						
DATA FILE	OCTAVE BAND FREQUENCIES					NRC	SAA	
NO.	125	250	250 500 1000 2000 4000					
L0012.01D	0.00	0.02	0.02	0.09	0.07	0.12	0.05	0.06

DECRIPTION	J	30GDD 1%						
DATA FILE NO.	•	3 OCTAVE SOUND ABSORPTION COEFFICIENTS AT THE CTAVE BAND FREQUENCIES 250 500 1000 2000 4000				NRC	SAA	
L0012.01E	0.00	0.13 0.38 0.70 0.53 0.51					0.45	0.44



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DECRIPTION	N	30GDD 3%	30GDD 3%					
DATA FILE NO.		AVE SOUND ABSORPTION COEFFICIENTS AT THE BAND FREQUENCIES					NRC	SAA
	123	250   500   1000   2000   4000						
L0012.01F	0.00	0.05	0.14	0.33	0.24	0.22	0.20	0.20

#### **SECTION 3**

#### **TEST METHODS**

The specimens were evaluated in accordance with the following:

**ASTM C423-17**, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

**ASTM E795-16**, Standard Practices for Mounting Test Specimens During Sound Absorption Tests

#### **SECTION 4**

#### **SPECIMEN MOUNTING**

For the Type G mounting, the test specimen was fabric hung from a solid beam parallel to the test surface. The specimen was hung 75 mm (3") from the test surface.



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#### **SECTION 5**

## **EQUIPMENT**

The equipment listed below meets the requirements of the test methods stated in Section 3 of this report.

INSTRUMENT	MANUFACTURER	MODEL	DESCRIPTION	ASSET#	CAL DATE
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	63763-3*	04/20
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65125*	05/20
Data Acquisition Card	National Instruments	PXI-4462	Data Acquisition Card	65126*	05/20
Receive Room Microphone	PBC Piezotronics	378B20	Microphone and Preamplifier	64907	01/20
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64908	01/20
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64909	01/20
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64910	01/20
Receive Room Microphone	PCB Piezotronics	378B20	Microphone and Preamplifier	64911	10/19
Receive Room Environmental Indicator	Comet	T7510	Receive Room	64915	01/20
Microphone Calibrator	Norsonic	1251	Acoustical Calibrator	Y002919	04/20

st-Note: The calibration frequency for this equipment is every two years per the manufacturer's recommendation.

## **TEST CHAMBER**

	VOLUME	DESCRIPTION
RECEIVE ROOM	234 m³	Rotating vane and stationary diffusers
		Temperature and humidity controlled
		Isolation pads under the floor



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#### **SECTION 6**

#### LIST OF OFFICIAL OBSERVERS

NAME	COMPANY
Zachary Golden	Intertek B&C

## **SECTION 7**

#### **TEST PROCEDURE**

The sensitivity of the microphones was checked before measurements were conducted. Empty room sound absorption measurements were conducted before the specimen was installed. Full room sound absorption measurements were conducted after the specimen was installed.

For the empty and full room measurements, ten decay measurements were conducted at each of the five microphone positions. Data was obtained at 1/3 octave band frequencies ranging from 80 to 5000 hertz. The air temperature and relative humidity conditions were monitored and recorded during the measurements.

Intertek B&C will store samples of test specimens for four years.

#### **SECTION 8**

#### **TEST CALCULATIONS**

The Sound Absorption Coefficient is the full room absorption minus the empty room absorption divided by the area of the sample in m<sup>2</sup>. The Sound Absorption Coefficient is dimensionless.

The Noise Reduction Coefficient (NRC) rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000 and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

The Sound Absorption Average (SAA) rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.



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# **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

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#### **SECTION 9**

#### **TEST SPECIMEN DESCRIPTION**

SAMPLE TYPE	Roller shade screen fabric
MOUNTING TYPE	G

The fabric was arranged to produce, 2.79 m by 2.51 m (110" by 99") test specimen.

TEST OPTION	DESCRIPTION	THICKNESS	WEIGHT	TOTAL WIEGHT
L0012.01A	30DN 1%	0.61 mm	5.22 kg/m <sup>2</sup>	36.74 kg
L0012.01A	30DN 1/0	0.024"	1.07 lbs/ft <sup>2</sup>	81 lbs
L0012.01B	30DN 3%	0.61 mm	3.95 kg/m <sup>2</sup>	27.67 kg
L0012.01B	30DN 3%	0.024"	0.81 lbs/ft <sup>2</sup>	61 lbs
L0012.01C	30DN 5%	0.56 mm	3.95 kg/m <sup>2</sup>	27.67 kg
L0012.01C	30DN 3%	0.022"	0.81 lbs/ft <sup>2</sup>	61 lbs
L0012.01D	30DN 10%	0.51 mm	3.27 kg/m <sup>2</sup>	23.13 kg
10012.010	30DN 10%	0.020"	0.67 lbs/ft <sup>2</sup>	51 lbs
L0012.01E	30GDD 1%	0.64 mm	4.59 kg/m <sup>2</sup>	32.21 kg
10012.016	30000 1%	0.025"	0.94 lbs/ft <sup>2</sup>	71 lbs
L0012.01F	30GDD 3%	0.66 mm	3.95 kg/m <sup>2</sup>	27.67 kg
LUU1Z.UIF	30000 3%	0.026"	0.81 lbs/ft <sup>2</sup>	61 lbs

Photographs are included in Section 11.

The client did not supply a report drawing of the test specimen.



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## **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

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#### **SECTION 10**

#### **TEST RESULTS**

#### **L0012.01A DATA**

TECHNICIAN	Zachary Golden			
SPECIMEN AREA	7.03 m <sup>2</sup>			
MOUNTING TYPE	G	Ĵ		
	EMPTY	FULL		

	EMPTY	FULL
TEMP °C	21.7	22.3
RH %	46	48
B.P. (mb)	986	982

FREQ		UNCERTAINTY	FULL ROOM	UNCERTAINTY	ABSORPTION	RELATIVE
	ABSORPTION		ABSORPTION		COEFFICIENT	UNCERTAINTY
(Hz)	(m <sup>2</sup> )		(m <sup>2</sup> )			
80	5.29	0.487	5.42	0.523	0.02	0.102
100	5.31	0.520	5.53	0.477	0.03	0.100
125	5.59	0.388	5.56	0.297	0.00	0.070
160	5.22	0.142	5.32	0.205	0.01	0.036
200	4.80	0.060	5.44	0.112	0.09	0.018
250	5.17	0.109	6.29	0.181	0.16	0.030
315	5.46	0.075	7.69	0.083	0.32	0.016
400	5.58	0.047	8.69	0.063	0.44	0.011
500	5.74	0.037	9.78	0.303	0.57	0.044
630	5.24	0.014	10.20	0.029	0.71	0.005
800	5.33	0.033	10.90	0.018	0.79	0.005
1000	5.46	0.027	11.19	0.027	0.82	0.005
1250	5.77	0.032	11.44	0.039	0.81	0.007
1600	5.83	0.019	11.09	0.022	0.75	0.004
2000	5.82	0.013	10.23	0.052	0.63	0.008
2500	6.12	0.008	10.58	0.149	0.63	0.021
3150	6.54	0.011	10.75	0.017	0.60	0.003
4000	7.13	0.004	10.95	0.013	0.54	0.002
5000	7.81	0.009	11.18	0.006	0.48	0.002

NRC RATING	0.55	(Noise Reduction Coefficient)
SAA RATING	0.56	(Sound Absorption Average)

<sup>1)</sup> The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

<sup>2)</sup> The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.



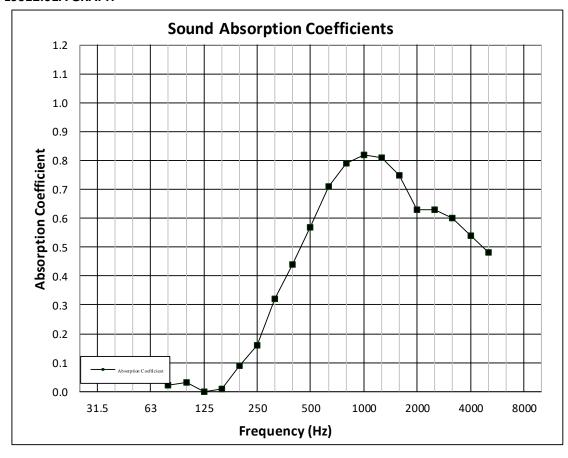
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#### **L0012.01A GRAPH**





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# **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

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#### **L0012.01B DATA**

TECHNICIAN	Zachary Golden			
SPECIMEN AREA	7.03 m <sup>2</sup>			
<b>MOUNTING TYPE</b>	G			

	EMPTY	FULL
TEMP °C	21.7	22.7
RH %	46	47
B.P. (mb)	986	983

FREQ	EMPTY ROOM	UNCERTAINTY	FULL ROOM	UNCERTAINTY	ABSORPTION	RELATIVE
	ABSORPTION		ABSORPTION		COEFFICIENT	UNCERTAINTY
(Hz)	(m <sup>2</sup> )		(m <sup>2</sup> )			
80	5.29	0.487	5.32	0.565	0.00	0.106
100	5.31	0.520	5.49	0.720	0.03	0.126
125	5.59	0.388	5.59	0.716	0.00	0.116
160	5.22	0.142	5.23	0.190	0.00	0.034
200	4.80	0.060	5.02	0.116	0.03	0.019
250	5.17	0.109	5.46	0.192	0.04	0.031
315	5.46	0.075	5.97	0.069	0.07	0.014
400	5.58	0.047	6.10	0.061	0.07	0.011
500	5.74	0.037	6.47	0.228	0.10	0.033
630	5.24	0.014	6.49	0.057	0.18	0.008
800	5.33	0.033	7.02	0.035	0.24	0.007
1000	5.46	0.027	7.49	0.037	0.29	0.007
1250	5.77	0.032	7.95	0.026	0.31	0.006
1600	5.83	0.019	7.76	0.029	0.28	0.005
2000	5.82	0.013	7.21	0.027	0.20	0.004
2500	6.12	0.008	7.60	0.267	0.21	0.038
3150	6.54	0.011	7.96	0.006	0.20	0.002
4000	7.13	0.004	8.51	0.012	0.20	0.002
5000	7.81	0.009	8.89	0.011	0.15	0.002

NRC RATING	0.15	(Noise Reduction Coefficient)
SAA RATING	0.17	(Sound Absorption Average)

<sup>1)</sup> The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

<sup>2)</sup> The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.



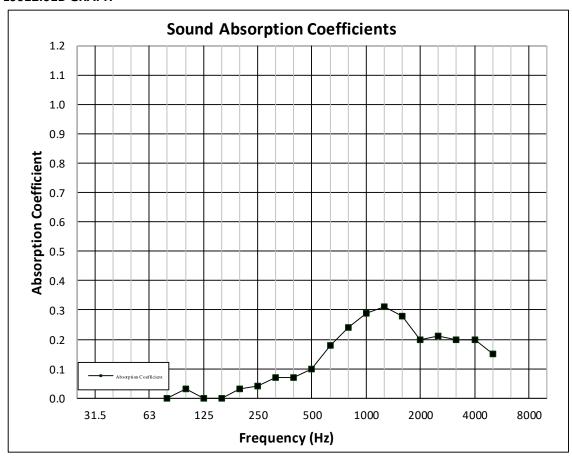
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#### **L0012.01B GRAPH**





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# **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

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#### **L0012.01C DATA**

TECHNICIAN	Zachary Golden		
SPECIMEN AREA	7.03 m <sup>2</sup>		
<b>MOUNTING TYPE</b>	G		
	EMPTY	FULL	

	EMPTY	FULL
TEMP °C	21.7	21.9
RH %	46	48
B.P. (mb)	986	985

FREQ	EMPTY ROOM	UNCERTAINTY	FULL ROOM	UNCERTAINTY	ABSORPTION	RELATIVE
	ABSORPTION		ABSORPTION		COEFFICIENT	UNCERTAINTY
(Hz)	(m <sup>2</sup> )		(m <sup>2</sup> )			
80	5.29	0.487	5.30	0.533	0.00	0.103
100	5.31	0.520	5.46	0.433	0.02	0.096
125	5.59	0.388	5.59	0.511	0.00	0.091
160	5.22	0.142	5.24	0.130	0.00	0.027
200	4.80	0.060	4.94	0.114	0.02	0.018
250	5.17	0.109	5.34	0.101	0.02	0.021
315	5.46	0.075	5.73	0.042	0.04	0.012
400	5.58	0.047	5.90	0.061	0.05	0.011
500	5.74	0.037	6.24	0.249	0.07	0.036
630	5.24	0.014	6.09	0.036	0.12	0.006
800	5.33	0.033	6.43	0.046	0.16	0.008
1000	5.46	0.027	6.84	0.013	0.20	0.004
1250	5.77	0.032	7.27	0.024	0.21	0.006
1600	5.83	0.019	7.12	0.011	0.18	0.003
2000	5.82	0.013	6.72	0.033	0.13	0.005
2500	6.12	0.008	7.29	0.287	0.17	0.041
3150	6.54	0.011	7.64	0.010	0.16	0.002
4000	7.13	0.004	8.27	0.010	0.16	0.002
5000	7.81	0.009	8.80	0.003	0.14	0.001

NRC RATING	0.10	(Noise Reduction Coefficient)
SAA RATING	0.11	(Sound Absorption Average)

<sup>1)</sup> The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

<sup>2)</sup> The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.



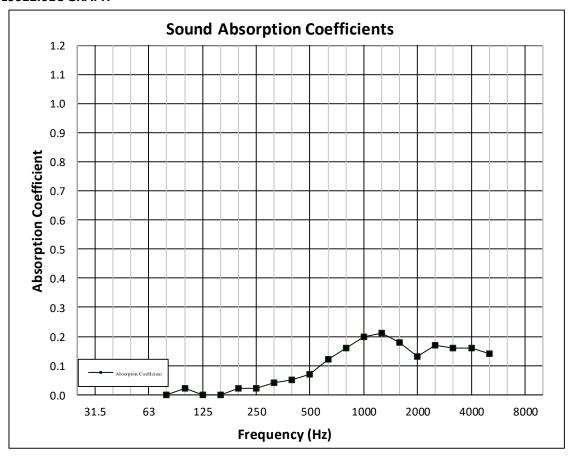
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#### **L0012.01C GRAPH**





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## **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

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#### **L0012.01D DATA**

TECHNICIAN	Zachary Golden			
SPECIMEN AREA	7.03 m <sup>2</sup>	7.03 m <sup>2</sup>		
<b>MOUNTING TYPE</b>	G	 G		

	EMPTY	FULL
TEMP °C	21.7	22.0
RH %	46	45
B.P. (mb)	986	984

FREQ	EMPTY ROOM	UNCERTAINTY	FULL ROOM	UNCERTAINTY	ABSORPTION	RELATIVE
	ABSORPTION		ABSORPTION		COEFFICIENT	UNCERTAINTY
(Hz)	(m <sup>2</sup> )		(m <sup>2</sup> )			
80	5.29	0.487	5.33	0.514	0.00	0.101
100	5.31	0.520	5.41	0.410	0.01	0.094
125	5.59	0.388	5.56	0.497	0.00	0.090
160	5.22	0.142	5.16	0.108	0.00	0.025
200	4.80	0.060	4.85	0.090	0.01	0.015
250	5.17	0.109	5.30	0.077	0.02	0.019
315	5.46	0.075	5.57	0.045	0.02	0.012
400	5.58	0.047	5.68	0.061	0.01	0.011
500	5.74	0.037	5.90	0.228	0.02	0.033
630	5.24	0.014	5.64	0.038	0.06	0.006
800	5.33	0.033	5.82	0.026	0.07	0.006
1000	5.46	0.027	6.07	0.036	0.09	0.006
1250	5.77	0.032	6.46	0.025	0.10	0.006
1600	5.83	0.019	6.48	0.035	0.09	0.006
2000	5.82	0.013	6.28	0.064	0.07	0.009
2500	6.12	0.008	6.92	0.293	0.11	0.042
3150	6.54	0.011	7.19	0.011	0.09	0.002
4000	7.13	0.004	7.96	0.006	0.12	0.001
5000	7.81	0.009	8.66	0.009	0.12	0.002

NRC RATING	0.05	(Noise Reduction Coefficient)
SAA RATING	0.06	(Sound Absorption Average)

Notes:

This page alone is not a complete report.

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<sup>1)</sup> The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

<sup>2)</sup> The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.



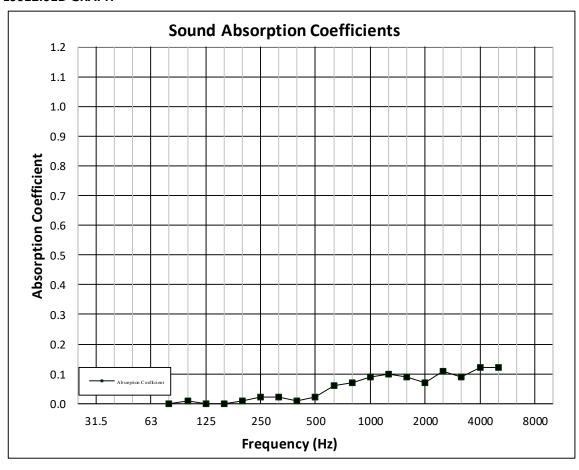
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#### **L0012.01E DATA**

TECHNICIAN	Zachary Golden		
SPECIMEN AREA	7.03 m <sup>2</sup>		
<b>MOUNTING TYPE</b>	G		

	EMPTY	FULL
TEMP °C	21.7	22.1
RH %	46	48
B.P. (mb)	986	983

FREQ	EMPTY ROOM	UNCERTAINTY	FULL ROOM	UNCERTAINTY		RELATIVE
	ABSORPTION		ABSORPTION		COEFFICIENT	UNCERTAINTY
(Hz)	(m <sup>2</sup> )		(m <sup>2</sup> )			
80	5.29	0.487	5.29	0.748	0.00	0.127
100	5.31	0.520	5.50	0.800	0.03	0.136
125	5.59	0.388	5.38	0.877	0.00	0.137
160	5.22	0.142	5.60	0.215	0.05	0.037
200	4.80	0.060	5.27	0.225	0.07	0.033
250	5.17	0.109	6.09	0.083	0.13	0.020
315	5.46	0.075	6.83	0.053	0.19	0.013
400	5.58	0.047	7.37	0.069	0.26	0.012
500	5.74	0.037	8.40	0.358	0.38	0.051
630	5.24	0.014	8.83	0.036	0.51	0.005
800	5.33	0.033	9.66	0.007	0.62	0.005
1000	5.46	0.027	10.36	0.021	0.70	0.005
1250	5.77	0.032	10.82	0.030	0.72	0.006
1600	5.83	0.019	10.38	0.015	0.65	0.003
2000	5.82	0.013	9.54	0.044	0.53	0.007
2500	6.12	0.008	9.73	0.186	0.51	0.027
3150	6.54	0.011	10.08	0.016	0.50	0.003
4000	7.13	0.004	10.70	0.011	0.51	0.002
5000	7.81	0.009	10.94	0.009	0.45	0.002

NRC RATING	0.45	(Noise Reduction Coefficient)
SAA RATING	0.44	(Sound Absorption Average)

<sup>1)</sup> The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

<sup>2)</sup> The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.



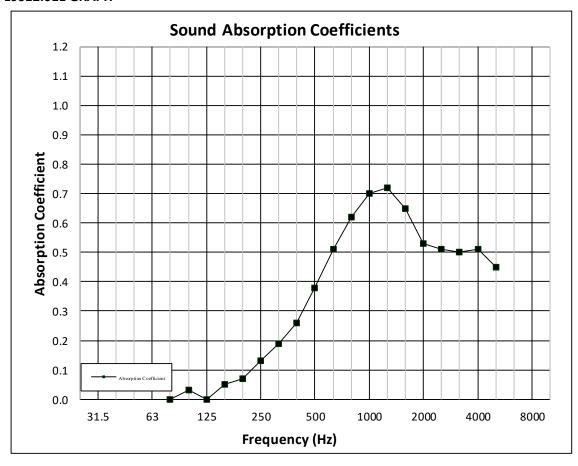
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# **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

Report No.: L0012.01-113-11-R0

Date: 06/12/20

#### **L0012.01E GRAPH**





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Date: 06/12/20

#### **L0012.01F DATA**

TECHNICIAN	Zachary Golden		
SPECIMEN AREA	7.03 m <sup>2</sup>		
<b>MOUNTING TYPE</b>	G		

	EMPTY	FULL
TEMP °C	21.7	22.4
RH %	46	49
B.P. (mb)	986	984

FREQ	EMPTY ROOM	UNCERTAINTY	FULL ROOM	UNCERTAINTY		RELATIVE
	ABSORPTION		ABSORPTION		COEFFICIENT	UNCERTAINTY
(Hz)	(m <sup>2</sup> )		(m <sup>2</sup> )			
80	5.29	0.487	5.23	0.580	0.00	0.108
100	5.31	0.520	5.43	0.300	0.02	0.085
125	5.59	0.388	5.59	0.448	0.00	0.084
160	5.22	0.142	5.27	0.090	0.01	0.024
200	4.80	0.060	5.03	0.108	0.03	0.018
250	5.17	0.109	5.51	0.093	0.05	0.020
315	5.46	0.075	6.00	0.059	0.08	0.014
400	5.58	0.047	6.28	0.026	0.10	0.008
500	5.74	0.037	6.70	0.250	0.14	0.036
630	5.24	0.014	6.76	0.029	0.22	0.005
800	5.33	0.033	7.28	0.022	0.28	0.006
1000	5.46	0.027	7.81	0.009	0.33	0.004
1250	5.77	0.032	8.28	0.020	0.36	0.005
1600	5.83	0.019	8.11	0.020	0.33	0.004
2000	5.82	0.013	7.49	0.035	0.24	0.005
2500	6.12	0.008	7.83	0.243	0.24	0.035
3150	6.54	0.011	8.09	0.003	0.22	0.002
4000	7.13	0.004	8.70	0.005	0.22	0.001
5000	7.81	0.009	8.97	0.004	0.16	0.001

NRC RATING	0.20	(Noise Reduction Coefficient)
SAA RATING	0.20	(Sound Absorption Average)

<sup>1)</sup> The NRC rating is the arithmetic average of the sound absorption coefficients at 250, 500, 1000, and 2000 hertz. The average is rounded to the nearest multiple of 0.05.

<sup>2)</sup> The SAA rating is the arithmetic average of the sound absorption coefficients at the frequencies ranging from 200 to 2500 hertz. The average is rounded to the nearest multiple of 0.01.



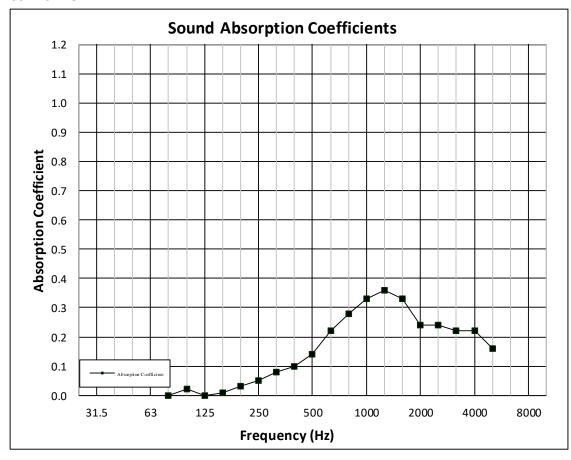
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#### **L0012.01F GRAPH**





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## **SECTION 11**

#### **PHOTOGRAPHS**



Photo No. 1 View of Installed Test Specimen



Photo No. 2 Side View of Installed Test Specimen



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# **TEST REPORT FOR DONGWON INDUSTRY USA LLC**

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## **SECTION 12**

#### **REVISION LOG**

REVISION #	DATE	PAGES	REVISION
0	06/12/20	N/A	Original Report Issue