

## REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Order No. 102761342

Date: May 31, 2017

REPORT NO. 102761342CRT-001c

**STATIC PRESSURE, SOUND POWER LEVEL,  
AREA FACTOR AND THROW TESTS ON A  
MODEL 2' X 2' PLAQUE SUPPLY  
SQUARE CEILING DIFFUSER  
WITH 8 INCH DIAMETER INLET**

RENDERED TO

**HAVACO TECHNOLOGIES INC  
2425 WEST 23RD STREET  
ERIE, PA 16506**

### INTRODUCTION

This report gives the results of tests conducted on a Model 2' by 2' plaque supply Square Ceiling Diffuser. The test results include Static Pressure, Area Factor, Throw and Sound Power Level. The sample was selected and supplied by the client and was received at the laboratories on October 6, 2016. The sample appeared to be in new unused condition upon receipt.

### AUTHORIZATION

Signed Intertek Quotation Number Qu-00716694

### TEST METHOD

The diffuser was tested in accordance with the ASHRAE 70-2006 Standard "Method of Testing for Rating the Performance of Air Outlets and Inlets", which incorporates ADC 1062: GRD-84 Test Code for Grilles, Registers and Diffusers. Acoustical data was obtained employing a Bruel & Kjaer Pulse Digital Frequency Analyzer. The reference sound source used for this test was a calibrated Bruel & Kjaer Type 4204, which conforms to the above standard. The octave band sound power levels were plotted on graph of Noise Criteria Curves which is in the ADC Test Code. These curves are reprinted with permission from the ASHRAE Handbook and Product Directory, 1976. The diffuser was installed in the facility and supplied with measured volumes of air. The static pressure was measured  $1\frac{1}{2}$  duct diameters upstream of the diffuser.



**DESCRIPTION OF TEST SPECIMEN**

MODEL 2' X 2' PLAQUE SUPPLY SQUARE CEILING DIFFUSER WITH 8 INCH DIAMETER INLET

The diffuser was constructed from plastic. The diffuser measured 23 3/4 inches square at the face and the inlet measured 8 inches in diameter. The diffuser was tested with supply air only. A photograph of the test sample is available on the last page of the report.

**EQUIPMENT**

Equipment	Calibration Date	Due Date	S/N	Model	Asset
Pulse Analyzer	3/13/2017	3/13/2018	2519258	7539	E446
Reference Sound Source	9/24/2015	9/24/2018	2036621	4204	A230
Microphone/Pre - DF	9/27/2016	9/27/2017	2381161	4942	E450

**RESULTS OF TESTS**

Octave Band Center  
Frequency Hertz

**MODEL 2' X 2' PLAQUE SUPPLY  
SQUARE CEILING DIFFUSER  
WITH 8 INCH DIAMETER INLET**

Discharge Sound Power Level dB re 10<sup>-12</sup> Watt

125	42.7*	44.0	46.6	49.5	52.1	57.3
250	37.8	38.8	41.4	45.5	48.7	54.0
500	32.7	34.4	38.1	41.8	45.4	51.0
1000	26.7	31.0	35.3	40.2	44.1	50.2
2000	19.5*	20.4*	25.1*	31.1	36.1	43.2
4000	18.1*	16.9*	17.4*	19.4*	24.5*	34.3
8000	21.1*	21.1*	21.2*	21.0*	21.2*	24.3*
Supply Air Volume, CFM.	200	225	250	285	325	400
Inlet Static Pressure, in. H <sub>2</sub> O	0.04	0.05	0.06	0.08	0.11	0.16
**Noise Criteria (NC)	16	19	24	30	34	40

\* Sound Power Level data 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.

\*\* Noise Criteria ratings were determined by subtracting a room absorption of 10dB from the Sound Power Level data.

**AREA FACTOR  $A_k$**

**FOR AIR OUTLETS**

**MODEL 2' X 2' PLAQUE SUPPLY SQUARE CEILING DIFFUSER WITH 8 INCH DIAMETER INLET**

					<b>Inlet Size</b>	4 "	<b>Radius</b>	Air Density	0.072	lbs/ft <sup>2</sup>	
Throw Dir.:	Horizontal				Neck Area (Sq. Ft.):	0.34906585					
Flow Meter:	Nozzle Metering Station				Anemometer:	Alnor Velometer Type 6000P					
					Serial Number:	6077AL			Date:	May 30, 2017	
Run											
Number	Anemometer - ( $V_k$ , FPM)				Static	Q2 Flow	Neck	Neck	Total	Area Fact.	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	Average	"H <sub>2</sub> O	CFM	Velocity	V.P.	Pressure	Ak
#1	800	800	800	775	793.75	0.05	225	644.58	0.0249	0.075	0.283
#2	1100	1150	1200	1200	1162.5	0.09	300	859.44	0.0442	0.134	0.258
#3	1700	1650	1650	1600	1650	0.21	450	1289.16	0.0995	0.309	0.273
										Average:	0.271



**MODEL 2' X 2' PLAQUE SUPPLY SQUARE CEILING DIFFUSER WITH 8 INCH DIAMETER INLET**

Distance		MODEL 2'x2' PLAQUE SUPPLY w/ 8" Diameter Inlet									
From		Inlet Static Pressure		0.040 " H2O							
Ceiling		Distance From Diffuser (Ft)						Air Volume		200 CFM	
Inches	0'	1'	2'	3'	4'	5'	6'	7'	8'		
1"	65	156	129	96	76	50	37	33	--		
3"	34	31	46	56	60	43	37	33	--		
6"	27	20	28	22	28	26	26	23	--		
9"	20	14	20	20	17	20	15	21	--		
12"	17	14	15	18	16	17	13	16	--		
18"	13	11	14	14	16	15	11	15	--		
24"	14	7	11	11	16	13	8	9	--		

Distance		MODEL 2'x2' PLAQUE SUPPLY w/ 8" Diameter Inlet									
From		Inlet Static Pressure		0.090 " H2O							
Ceiling		Distance From Diffuser (Ft)						Air Volume		300 CFM	
Inches	0'	1'	2'	4'	6'	8'	10'	12'			
1"	85	190	166	94	61	39	28	--			
3"	52	53	74	75	56	40	37	--			
6"	40	43	49	39	39	34	35	--			
9"	34	36	40	29	29	26	28	--			
12"	28	31	36	28	20	20	23	--			
18"	26	27	32	30	18	20	22	--			
24"	24	25	24	28	16	22	15	--			

Distance		MODEL 2'x2' PLAQUE SUPPLY w/ 8" Diameter Inlet									
From		Inlet Static Pressure		0.210 " H2O							
Ceiling		Distance From Diffuser (Ft)						Air Volume		450 CFM	
Inches	0'	2'	4'	6'	8'	10'	12'	14'	16'		
1"	176	285	183	120	85	69	31	13	--		
3"	89	117	124	117	83	75	38	16	--		
6"	68	71	63	75	55	58	40	21	--		
9"	51	55	44	38	45	51	46	24	--		
12"	43	46	46	38	38	39	41	24	--		
18"	42	45	45	39	36	34	36	30	--		
24"	45	41	38	41	38	37	36	29	--		

NOTE: All throw values are in feet per minute.

**PHOTOGRAPH OF TEST SAMPLE**



**CONCLUSION**

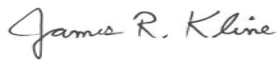
The test method employed for this test has no pass-fail criteria; therefore, the evaluation of the test results is left to the discretion of the client.

Dates of Tests: May 25, 2017 through May 30, 2017

Report Approved by:

  
Brian Cyr  
Engineer  
Acoustical Testing

Report Reviewed By:

  
James R. Kline  
Engineer/Quality Supervisor  
Acoustical Testing

Attachments: None