



**AIR MOVEMENT AND CONTROL
ASSOCIATION INTERNATIONAL, INC.**

International Headquarters
30 West University Drive
Arlington Heights, Illinois
60004-1893 USA

Phone: +1 847-394-0150
Fax: +1 847-253-0088
E-Mail: jparent@amca.org
Website: www.amca.org

Test No. 33025-S1

May 18, 2016

TO: Dae Ryun Ind Ltd
115 Wanjusandan 7-ro
Bongdong-eup, Wanju-gun, Jeon-Buk, CA REPUBLIC OF KOREA 55318

ATTN: Song Eun Jung
drair@daum.net

**SUBJECT: CONTRACT TESTING
MODEL No. DR-AF #3DD**

Attached are the test results of the subject model performed on April 04, 2016.

If you should have any questions concerning these data, please let us know.

Sincerely,
AIR MOVEMENT AND CONTROL
ASSOCIATION INTERNATIONAL, INC.

Josh Parent
Laboratory Manager

Attachment



Korea Testing Certification
 82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Test Information

Client: Daeryun Ind. LTD
 Test Purpose: Contract Test
 Date of Test: 2016-04-04
 Personnel: KTC_HONG
 Witness(es): None

Test Unit

Manufacturer: Daeryun Ind. LTD
 Type: DWDI Centrifugal
 Trade Name: DR-AF Series
 Model Number: DR-AF #3DD
 Nominal Size: 456 mm
 Number of Blades: 20
 Blade Setting: -
 Number of Stator Vanes: -
 Measured Impeller Diameter: 456 mm
 Measured Inlet Area: 0.181 m²
 Measured Outlet Area: 0.303 m²

Test Configuration

Setup: ANSI / AMCA Standard 300-14, Figure 2 (Inlet Sound)
 Installation Type: B (Unducted Inlet, Ducted Outlet)

Comments

Pre-Test & Post-Test Background Sound Pressures, L_{pb} (dB)

	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pb_PRE}	52.0	46.0	41.6	37.3	34.0	29.5	26.4	23.7	20.7	20.8	20.3	18.1
L_{pb_POST}	49.4	45.0	40.7	36.4	33.5	29.8	26.7	24.0	21.5	22.1	21.1	18.3
Difference	-2.6	-1.0	-0.9	-0.9	-0.5	0.3	0.3	0.3	0.8	1.3	0.8	0.2

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pb_PRE}	16.0	15.1	16.2	12.7	8.6	7.3	7.3	7.5	9.6	8.1	9.9	9.5
L_{pb_POST}	15.2	13.6	15.1	10.5	6.2	5.8	6.4	7.2	9.6	8.0	9.9	9.5
Difference	-0.8	-1.5	-1.1	-2.2	-2.4	-1.5	-0.9	-0.3	0.0	-0.1	0.0	0.0



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Reference Sound Source

	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pqm} (dB)	59.7	58.0	58.9	61.7	62.0	63.2	63.5	63.8	63.6	64.4	64.7	65.4
L_{pb} (dB)	52.0	46.0	41.6	37.3	34.0	29.5	26.4	23.7	20.7	20.8	20.3	18.1
$L_{pqm} - L_{pb}$ (dB)	7.7	12.0	17.3	24.4	28.0	33.7	37.1	40.1	42.9	43.6	44.4	47.3
L_{pq} (dB)	58.9	57.7	58.8	61.7	62.0	63.2	63.5	63.8	63.6	64.4	64.7	65.4
L_{Wr} (dB)	78.8	79.8	78.3	80.2	78.9	79.5	80.1	80.0	79.9	80.1	80.3	80.9
$L_{Wr} - L_{pq}$ (dB)	19.9	22.1	19.5	18.5	16.9	16.3	16.6	16.2	16.3	15.7	15.6	15.5
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pqm} (dB)	67.2	68.1	69.1	69.0	68.7	65.9	64.1	62.6	60.4	58.1	54.6	51.9
L_{pb} (dB)	16.0	15.1	16.2	12.7	8.6	7.3	7.3	7.5	9.6	8.1	9.9	9.5
$L_{pqm} - L_{pb}$ (dB)	51.2	53.0	52.9	56.3	60.1	58.6	56.8	55.1	50.8	50.0	44.7	42.4
L_{pq} (dB)	67.2	68.1	69.1	69.0	68.7	65.9	64.1	62.6	60.4	58.1	54.6	51.9
L_{Wr} (dB)	83.0	83.7	84.9	85.4	86.0	84.5	83.2	83.3	82.7	81.8	80.3	78.4
$L_{Wr} - L_{pq}$ (dB)	15.8	15.6	15.8	16.4	17.3	18.6	19.1	20.7	22.3	23.7	25.7	26.5
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

Data are not certified by AMCA



Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 1 - One-Third Octave Band Analysis

Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	110	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
108	3.749

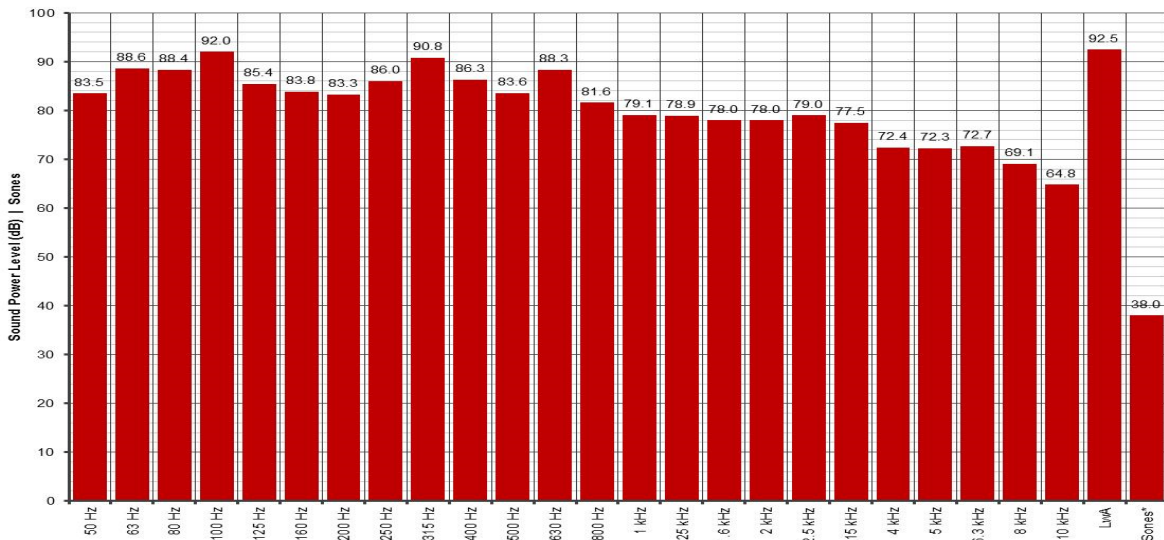
	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pm} (dB)	63.8	66.6	68.9	73.5	68.5	67.5	66.7	69.8	74.5	70.6	68.0	72.8
L_{pb} (dB)	51.1	45.8	40.8	36.3	34.7	30.6	27.2	24.4	21.8	21.4	20.9	18.2
$L_{pm} - L_{pb}$ (dB)	12.7	20.8	28.1	37.2	33.8	36.9	39.5	45.4	52.7	49.2	47.1	54.6
L_p (dB)	63.6	66.6	68.9	73.5	68.5	67.5	66.7	69.8	74.5	70.6	68.0	72.8
$L_{Wr} - L_{pq}$ (dB)	19.9	22.1	19.5	18.5	16.9	16.3	16.6	16.2	16.3	15.7	15.6	15.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	83.5	88.6	88.4	92.0	85.4	83.8	83.3	86.0	90.8	86.3	83.6	88.3
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	3.23	5.43	6.14	9.06	6.56	6.32	6.52	8.05	11.31	9.20	8.35	11.66

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pm} (dB)	65.8	63.5	63.1	61.6	60.7	60.4	58.4	51.7	50.0	49.0	43.4	38.3
L_{pb} (dB)	16.1	16.4	16.7	17.3	14.0	8.0	6.5	7.2	9.5	8.0	9.9	9.5
$L_{pm} - L_{pb}$ (dB)	49.7	47.1	46.4	44.3	46.7	52.4	51.9	44.5	40.5	41.0	33.5	28.8
L_p (dB)	65.8	63.5	63.1	61.6	60.7	60.4	58.4	51.7	50.0	49.0	43.4	38.3
$L_{Wr} - L_{pq}$ (dB)	15.8	15.6	15.8	16.4	17.3	18.6	19.1	20.7	22.3	23.7	25.7	26.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	81.6	79.1	78.9	78.0	78.0	79.0	77.5	72.4	72.3	72.7	69.1	64.8
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	8.35	7.64	8.00	8.05	8.55	9.60	9.30	7.36	7.72	8.40	7.24	5.15

L_{WA}
92.5

Sones*
38

Determination 1 Results



* Sone calculation based on a hemispherical free field at 1.524 m.



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Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 2 - One-Third Octave Band Analysis

Fan Inlet Test Conditions:

Test Conditions Converted to Standard Air:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)	P_s (Pa)	Q (m ³ /s)
101.64	14.8	9.0	14.8	239	1.23	1797	234	3.567

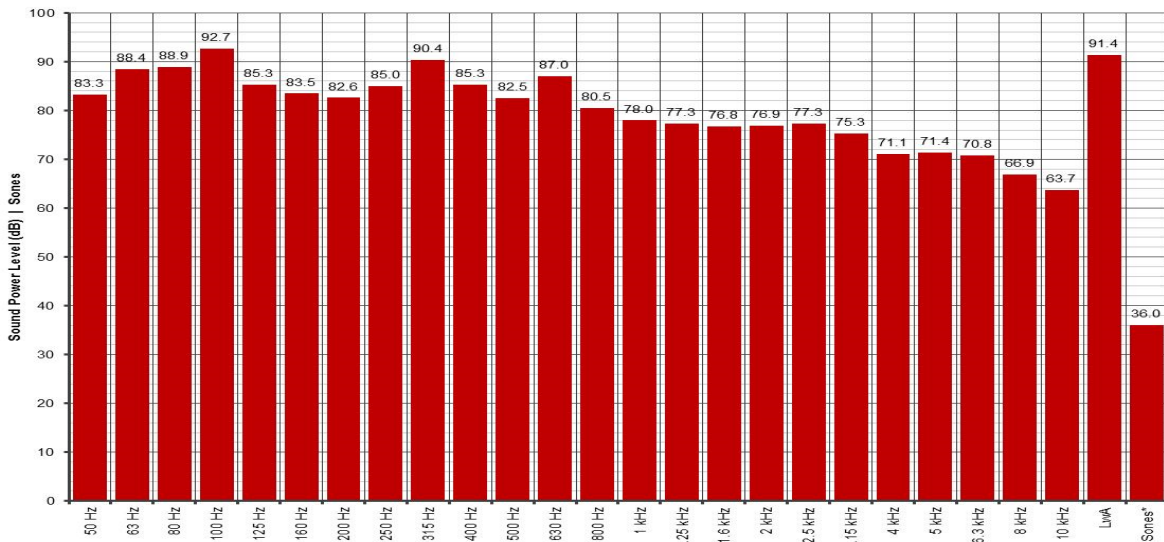
	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pm} (dB)	63.6	66.4	69.4	74.2	68.4	67.2	66.0	68.8	74.1	69.6	66.9	71.5
L_{pb} (dB)	51.1	45.8	40.8	36.3	34.7	30.6	27.2	24.4	21.8	21.4	20.9	18.2
$L_{pm} - L_{pb}$ (dB)	12.5	20.6	28.6	37.9	33.7	36.6	38.8	44.4	52.3	48.2	46.0	53.3
L_p (dB)	63.3	66.4	69.4	74.2	68.4	67.2	66.0	68.8	74.1	69.6	66.9	71.5
$L_{Wr} - L_{pq}$ (dB)	19.9	22.1	19.5	18.5	16.9	16.3	16.6	16.2	16.3	15.7	15.6	15.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	83.3	88.4	88.9	92.7	85.3	83.5	82.6	85.0	90.4	85.3	82.5	87.0
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	3.18	5.36	6.38	9.43	6.52	6.20	6.24	7.60	11.04	8.70	7.80	10.80

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pm} (dB)	64.7	62.4	61.5	60.4	59.6	58.7	56.2	50.4	49.1	47.1	41.2	37.2
L_{pb} (dB)	16.1	16.4	16.7	17.3	14.0	8.0	6.5	7.2	9.5	8.0	9.9	9.5
$L_{pm} - L_{pb}$ (dB)	48.6	46.0	44.8	43.1	45.6	50.7	49.7	43.2	39.6	39.1	31.3	27.7
L_p (dB)	64.7	62.4	61.5	60.4	59.6	58.7	56.2	50.4	49.1	47.1	41.2	37.2
$L_{Wr} - L_{pq}$ (dB)	15.8	15.6	15.8	16.4	17.3	18.6	19.1	20.7	22.3	23.7	25.7	26.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	80.5	78.0	77.3	76.8	76.9	77.3	75.3	71.1	71.4	70.8	66.9	63.7
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	7.80	7.20	7.32	7.52	8.00	8.70	8.20	6.84	7.36	7.52	6.36	4.83

L_{WA}
91.4

Sones*
36

Determination 2 Results



* Sone calculation based on a hemispherical free field at 1.524 m.



Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 3 - One-Third Octave Band Analysis

Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	400	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
392	3.153

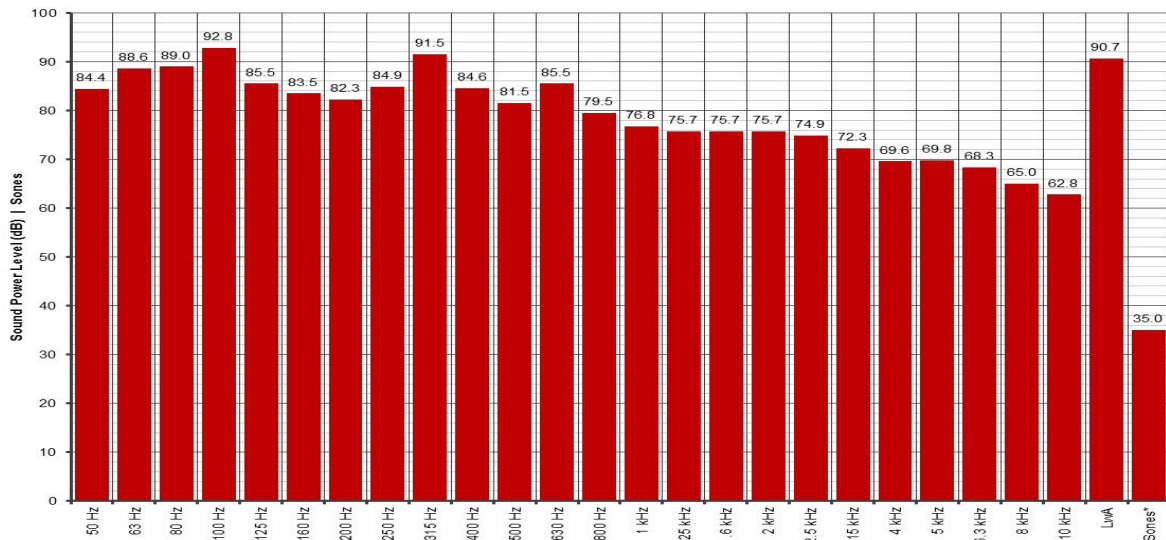
	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pm} (dB)	64.7	66.6	69.5	74.3	68.6	67.2	65.7	68.7	75.2	68.9	65.9	70.0
L_{pb} (dB)	51.1	45.8	40.8	36.3	34.7	30.6	27.2	24.4	21.8	21.4	20.9	18.2
$L_{pm} - L_{pb}$ (dB)	13.6	20.8	28.7	38.0	33.9	36.6	38.5	44.3	53.4	47.5	45.0	51.8
L_p (dB)	64.5	66.6	69.5	74.3	68.6	67.2	65.7	68.7	75.2	68.9	65.9	70.0
$L_{Wr} - L_{pq}$ (dB)	19.9	22.1	19.5	18.5	16.9	16.3	16.6	16.2	16.3	15.7	15.6	15.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	84.4	88.6	89.0	92.8	85.5	83.5	82.3	84.9	91.5	84.6	81.5	85.5
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	3.46	5.43	6.43	9.49	6.60	6.20	6.12	7.56	11.80	8.35	7.40	9.90

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pm} (dB)	63.7	61.2	59.9	59.3	58.4	56.3	53.2	48.9	47.5	44.6	39.3	36.3
L_{pb} (dB)	16.1	16.4	16.7	17.3	14.0	8.0	6.5	7.2	9.5	8.0	9.9	9.5
$L_{pm} - L_{pb}$ (dB)	47.6	44.8	43.2	42.0	44.4	48.3	46.7	41.7	38.0	36.6	29.4	26.8
L_p (dB)	63.7	61.2	59.9	59.3	58.4	56.3	53.2	48.9	47.5	44.6	39.3	36.3
$L_{Wr} - L_{pq}$ (dB)	15.8	15.6	15.8	16.4	17.3	18.6	19.1	20.7	22.3	23.7	25.7	26.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	79.5	76.8	75.7	75.7	75.7	74.9	72.3	69.6	69.8	68.3	65.0	62.8
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	7.40	6.72	6.68	7.08	7.48	7.56	6.92	6.24	6.72	6.52	5.65	4.56

L_{WA}
90.7

Sones*
35

Determination 3 Results



* Sone calculation based on a hemispherical free field at 1.524 m.



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Test Number
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Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 4 - One-Third Octave Band Analysis

Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	574	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
562	2.793

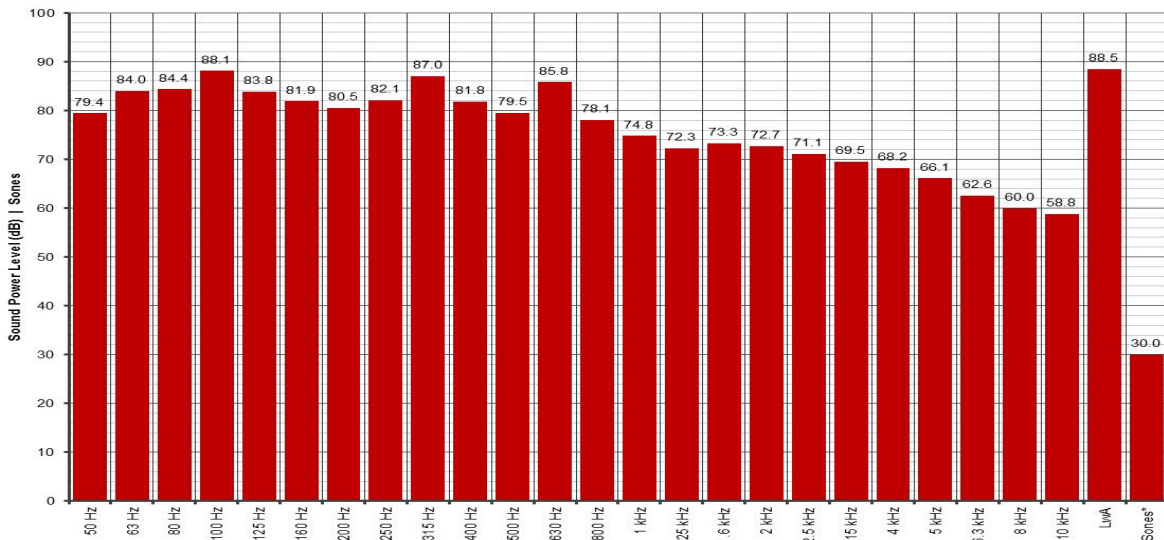
	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pm} (dB)	60.1	62.0	64.9	69.6	66.9	65.6	63.9	65.9	70.7	66.1	63.9	70.3
L_{pb} (dB)	51.1	45.8	40.8	36.3	34.7	30.6	27.2	24.4	21.8	21.4	20.9	18.2
$L_{pm} - L_{pb}$ (dB)	9.0	16.2	24.1	33.3	32.2	35.0	36.7	41.5	48.9	44.7	43.0	52.1
L_p (dB)	59.5	61.9	64.9	69.6	66.9	65.6	63.9	65.9	70.7	66.1	63.9	70.3
$L_{Wr} - L_{pq}$ (dB)	19.9	22.1	19.5	18.5	16.9	16.3	16.6	16.2	16.3	15.7	15.6	15.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	79.4	84.0	84.4	88.1	83.8	81.9	80.5	82.1	87.0	81.8	79.5	85.8
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	2.43	3.87	4.61	6.97	5.88	5.62	5.50	6.44	9.05	7.12	6.60	10.08

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pm} (dB)	62.3	59.2	56.5	56.9	55.4	52.5	50.4	47.5	43.8	38.9	34.3	32.3
L_{pb} (dB)	16.1	16.4	16.7	17.3	14.0	8.0	6.5	7.2	9.5	8.0	9.9	9.5
$L_{pm} - L_{pb}$ (dB)	46.2	42.8	39.8	39.6	41.4	44.5	43.9	40.3	34.3	30.9	24.4	22.8
L_p (dB)	62.3	59.2	56.5	56.9	55.4	52.5	50.4	47.5	43.8	38.9	34.3	32.3
$L_{Wr} - L_{pq}$ (dB)	15.8	15.6	15.8	16.4	17.3	18.6	19.1	20.7	22.3	23.7	25.7	26.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	78.1	74.8	72.3	73.3	72.7	71.1	69.5	68.2	66.1	62.6	60.0	58.8
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	6.84	5.92	5.44	6.12	6.28	6.04	5.80	5.71	5.38	4.63	4.20	3.57

L_{WA}
88.5

Sones*
30

Determination 4 Results



* Sone calculation based on a hemispherical free field at 1.524 m.



Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
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Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 5 - One-Third Octave Band Analysis

Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	763	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
747	2.371

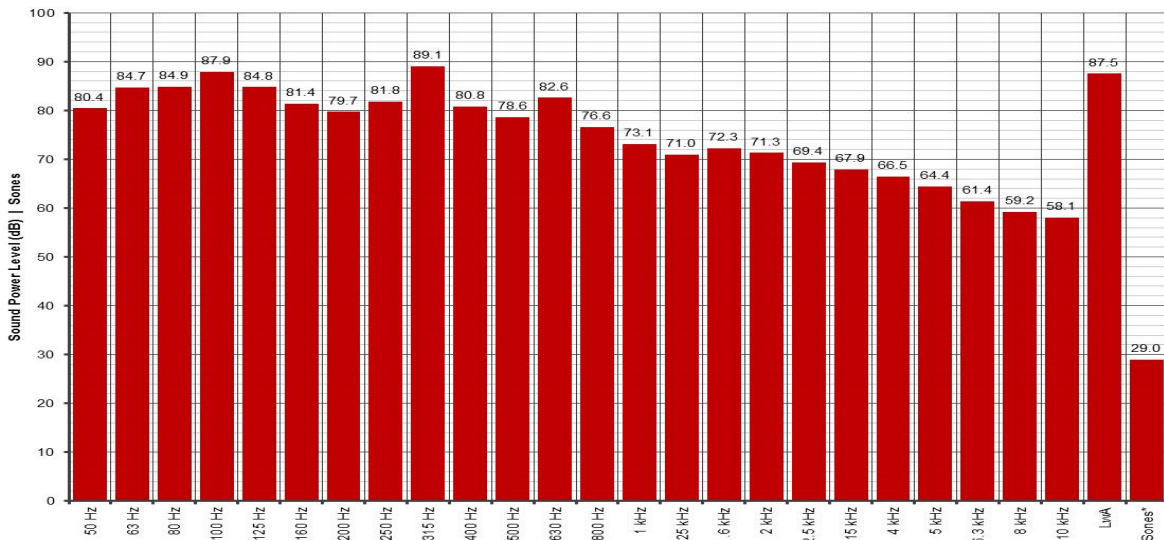
	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pm} (dB)	61.0	62.7	65.4	69.4	67.9	65.1	63.1	65.6	72.8	65.1	63.0	67.1
L_{pb} (dB)	51.1	45.8	40.8	36.3	34.7	30.6	27.2	24.4	21.8	21.4	20.9	18.2
$L_{pm} - L_{pb}$ (dB)	9.9	16.9	24.6	33.1	33.2	34.5	35.9	41.2	51.0	43.7	42.1	48.9
L_p (dB)	60.5	62.6	65.4	69.4	67.9	65.1	63.1	65.6	72.8	65.1	63.0	67.1
$L_{Wr} - L_{pq}$ (dB)	19.9	22.1	19.5	18.5	16.9	16.3	16.6	16.2	16.3	15.7	15.6	15.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	80.4	84.7	84.9	87.9	84.8	81.4	79.7	81.8	89.1	80.8	78.6	82.6
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	2.61	4.09	4.79	6.88	6.32	5.47	5.26	6.32	10.26	6.72	6.24	8.35

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pm} (dB)	60.8	57.5	55.2	55.9	54.0	50.8	48.8	45.8	42.1	37.7	33.5	31.6
L_{pb} (dB)	16.1	16.4	16.7	17.3	14.0	8.0	6.5	7.2	9.5	8.0	9.9	9.5
$L_{pm} - L_{pb}$ (dB)	44.7	41.1	38.5	38.6	40.0	42.8	42.3	38.6	32.6	29.7	23.6	22.1
L_p (dB)	60.8	57.5	55.2	55.9	54.0	50.8	48.8	45.8	42.1	37.7	33.5	31.6
$L_{Wr} - L_{pq}$ (dB)	15.8	15.6	15.8	16.4	17.3	18.6	19.1	20.7	22.3	23.7	25.7	26.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	76.6	73.1	71.0	72.3	71.3	69.4	67.9	66.5	64.4	61.4	59.2	58.1
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	6.24	5.38	5.05	5.74	5.74	5.47	5.32	5.20	4.87	4.28	4.00	3.42

L_{WA}
87.5

$Sones^*$
29

Determination 5 Results



* Sone calculation based on a hemispherical free field at 1.524 m.



Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 6 - One-Third Octave Band Analysis

Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	913	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
894	2.030

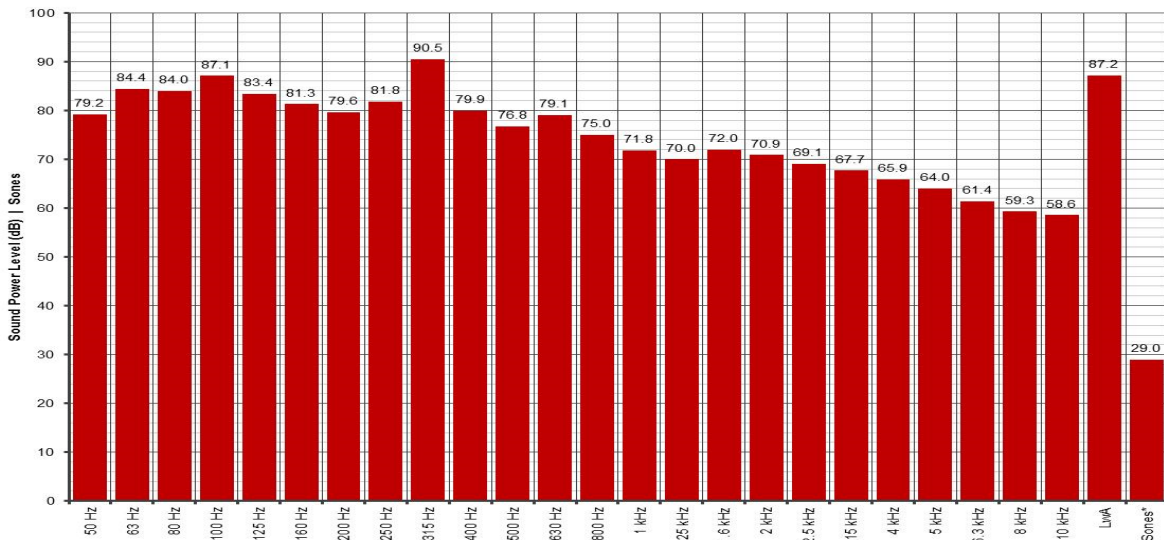
	One-Third Octave band Center Frequency (50 Hz - 630 Hz)											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
L_{pm} (dB)	59.9	62.4	64.5	68.6	66.5	65.0	63.0	65.6	74.2	64.2	61.2	63.6
L_{pb} (dB)	51.1	45.8	40.8	36.3	34.7	30.6	27.2	24.4	21.8	21.4	20.9	18.2
$L_{pm} - L_{pb}$ (dB)	8.8	16.6	23.7	32.3	31.8	34.4	35.8	41.2	52.4	42.8	40.3	45.4
L_p (dB)	59.3	62.3	64.5	68.6	66.5	65.0	63.0	65.6	74.2	64.2	61.2	63.6
$L_{Wr} - L_{pq}$ (dB)	19.9	22.1	19.5	18.5	16.9	16.3	16.6	16.2	16.3	15.7	15.6	15.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	79.2	84.4	84.0	87.1	83.4	81.3	79.6	81.8	90.5	79.9	76.8	79.1
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	2.39	4.00	4.47	6.49	5.71	5.44	5.23	6.32	11.10	6.36	5.59	6.84

	One-Third Octave band Center Frequency (800 Hz - 10 kHz)											
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz
L_{pm} (dB)	59.2	56.2	54.2	55.6	53.6	50.5	48.6	45.2	41.7	37.7	33.6	32.1
L_{pb} (dB)	16.1	16.4	16.7	17.3	14.0	8.0	6.5	7.2	9.5	8.0	9.9	9.5
$L_{pm} - L_{pb}$ (dB)	43.1	39.8	37.5	38.3	39.6	42.5	42.1	38.0	32.2	29.7	23.7	22.6
L_p (dB)	59.2	56.2	54.2	55.6	53.6	50.5	48.6	45.2	41.7	37.7	33.6	32.1
$L_{Wr} - L_{pq}$ (dB)	15.8	15.6	15.8	16.4	17.3	18.6	19.1	20.7	22.3	23.7	25.7	26.5
E (dB)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
L_{Wm} (dB)	75.0	71.8	70.0	72.0	70.9	69.1	67.7	65.9	64.0	61.4	59.3	58.6
Background:	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good
s	5.65	4.99	4.75	5.65	5.62	5.38	5.26	5.02	4.75	4.28	4.03	3.53

L_{WA}
87.2

Sones*
29

Determination 6 Results



* Sone calculation based on a hemispherical free field at 1.524 m.



Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 1 - Full Octave Band Analysis

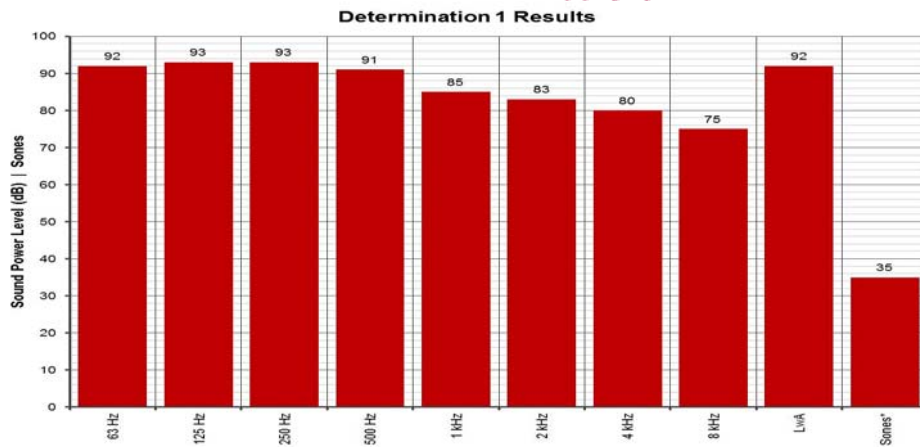
Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	110	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
108	3.749

L_{wm} (dB) s	Full Octave band Center Frequency								L_{WA}	Sones*
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
	92	93	93	91	85	83	80	75	92	35
	7.0	10.4	11.9	13.3	10.7	11.5	11.1	10.0		



* Sone calculation based on a hemispherical free field at 1.524 m.

Determination 2 - Full Octave Band Analysis

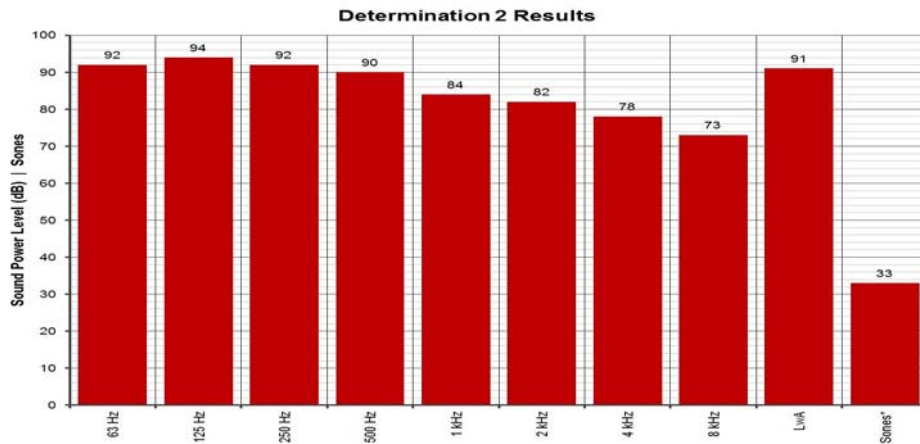
Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	239	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
234	3.567

L_{wm} (dB) s	Full Octave band Center Frequency								L_{WA}	Sones*
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
	92	94	92	90	84	82	78	73	91	33
	7.1	10.7	11.5	12.3	10.0	10.7	10.1	9.0		



* Sone calculation based on a hemispherical free field at 1.524 m.



Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 3 - Full Octave Band Analysis

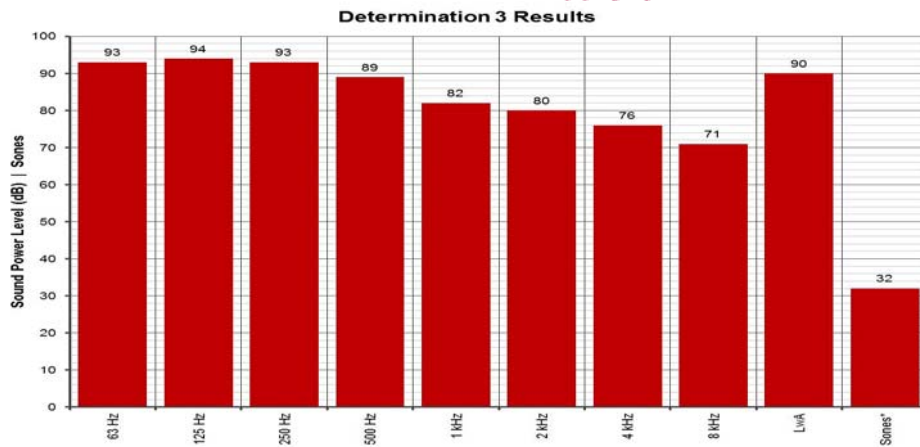
Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	400	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
392	3.153

L_{wm} (dB) s	Full Octave band Center Frequency								L_{WA} 90	Sones*
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
	93	94	93	89	82	80	76	71		32
	7.2	10.8	12.0	11.4	9.3	9.7	8.8	7.9		



* Sone calculation based on a hemispherical free field at 1.524 m.

Determination 4 - Full Octave Band Analysis

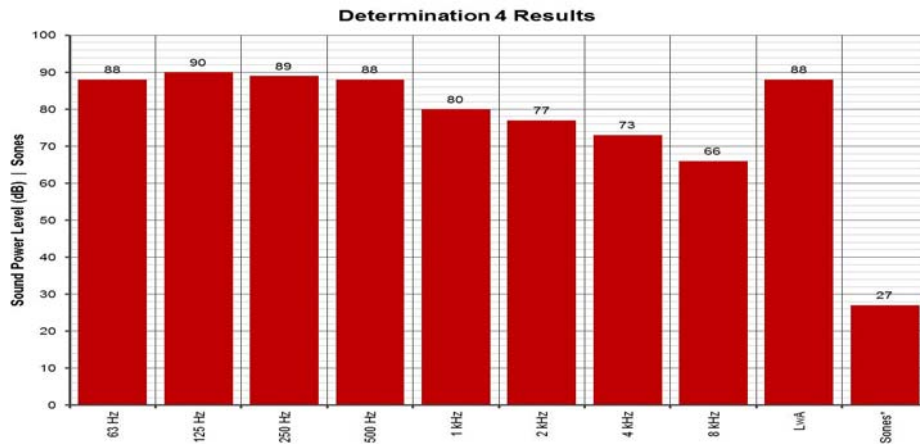
Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	574	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
562	2.793

L_{wm} (dB) s	Full Octave band Center Frequency								L_{WA} 88	Sones*
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
	88	90	89	88	80	77	73	66		27
	5.1	8.6	9.5	10.8	8.3	8.2	7.6	5.8		



* Sone calculation based on a hemispherical free field at 1.524 m.



Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Determination 5 - Full Octave Band Analysis

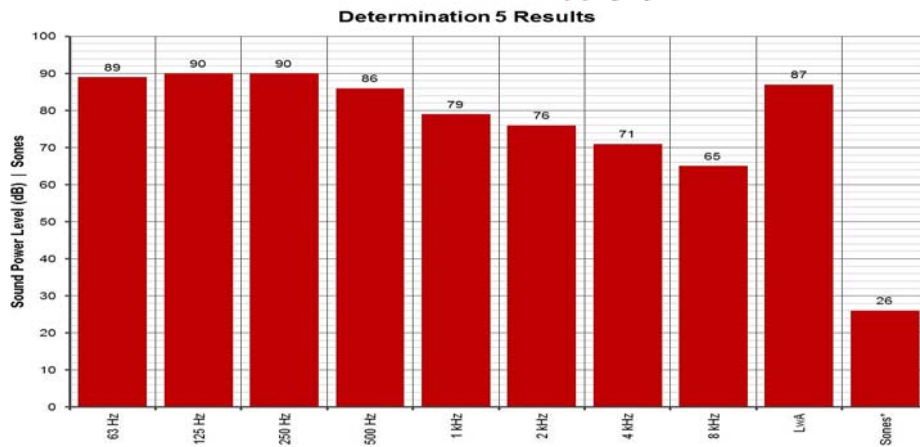
Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	763	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
747	2.371

L_{wm} (dB)	Full Octave band Center Frequency								L_{WA}	Sones*
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
s	89	90	90	86	79	76	71	65	87	26
	5.4	8.7	10.3	9.4	7.6	7.6	6.9	5.5		



* Sone calculation based on a hemispherical free field at 1.524 m.

Determination 6 - Full Octave Band Analysis

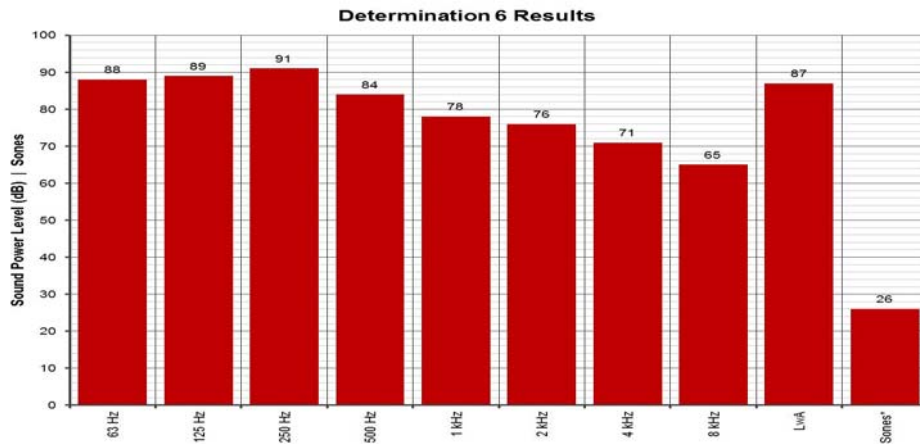
Fan Inlet Test Conditions:

P_b (kPa)	t_{d0} (°C)	t_{w0} (°C)	t_{d1} (°C)	P_{s1} (Pa)	ρ (kg/m ³)	N (rpm)
101.64	14.8	9.0	14.8	913	1.23	1797

Test Conditions Converted to Standard Air:

P_s (Pa)	Q (m ³ /s)
894	2.030

L_{wm} (dB)	Full Octave band Center Frequency								L_{WA}	Sones*
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz		
s	88	89	91	84	78	76	71	65	87	26
	5.1	8.2	11.0	8.3	7.0	7.4	6.8	5.6		



* Sone calculation based on a hemispherical free field at 1.524 m.

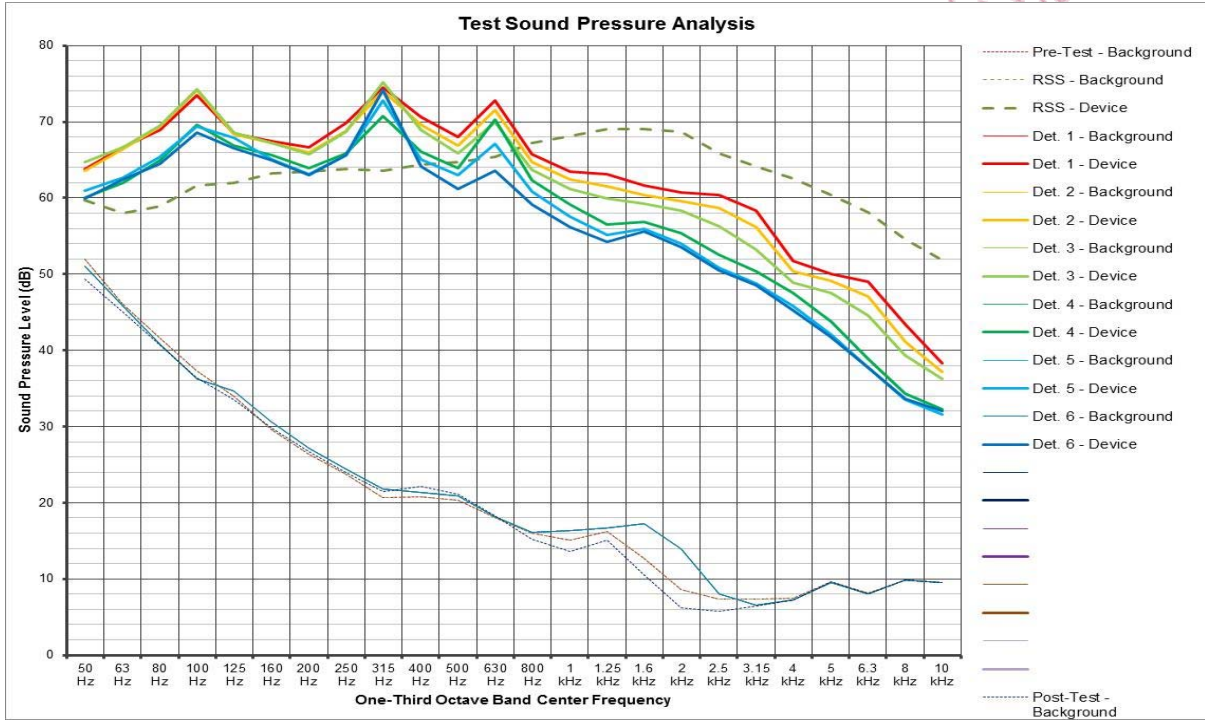


Korea Testing Certification
 82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

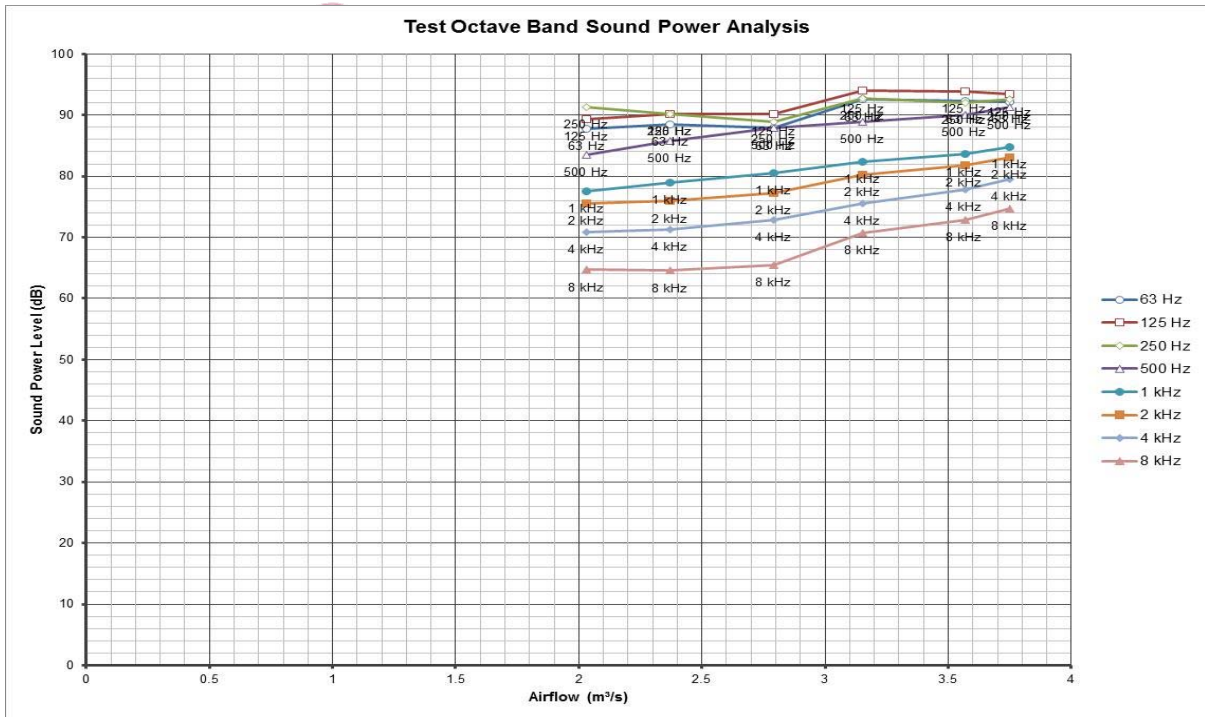
Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B

Test Sound Pressure Analysis



Test Octave Band Sound Power Analysis





Korea Testing Certification
82, Pyeongtaekhang-ro 156 beon-gil, Poseung-eup, Pyeongtaek-si, Gyeonggi-do, Korea

Test Number
33025-S1

Test Method per ANSI / AMCA Standard 300-14, Figure 2 Setup, Installation Type B



**KTC INSTRUMENT LIST**

Test Number: 33025-S1

Date: 04-Apr-16

Technician KTC_HONG

The following instrument, calibrated as applicable per the test standard were used for this test

Facility: KTC R 1240

Standard : AMCA 300-14

Figure : Figure 12

Pressure

Barometer									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
■	3093-3	YOKOGAWA	UNE31-SHS2		0	6818BA030		2015-05-28	2016-05-28

Pressure Meter									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
■	3093-33	YOKOGAWA	EJA110A	KTC R 1240	7	91G740641	-300-300 mmWg.	2015-05-28	2016-05-28
■	3093-34	YOKOGAWA	EJA110A	KTC R 1240	5	91G740640	0 - 300 mmWg.	2015-05-28	2016-05-28
□	3093-25	YOKOGAWA	EJA110A	KTC C 1260	7	91HC23940	-300 - 700 mmWg.	2015-05-28	2016-05-28
□	3093-26	YOKOGAWA	EJA110A	KTC C 1260	5	91J208748	0 - 300 mmWg.	2015-05-28	2016-05-28
□	3093-18	YOKOGAWA	EJA110A	KTC L 1560	8	91HA27332	-700 - 300 mmWg.	2015-05-28	2016-05-28
□	3093-19	YOKOGAWA	EJA110A	KTC L 1560	5	91J208747	0 - 300 mmWg.	2015-05-28	2016-05-28

Temperature

RTD									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
■	3093-31	YAMARI	PT 100	KTC R 1240	5	1570329	-40-250 Celsius	2015-05-28	2016-05-28
□	3434-1	YAMARI	PT 100	KTC C 1260	5	1570318	-40-250 Celsius	2015-05-28	2016-05-28
□	3093-20	YAMARI	PT 100	KTC L 1560	2	1570328	-40-250 Celsius	2015-05-28	2016-05-28
□	3093-22	YAMARI	PT 100	KTC L 1560	8	646062	-40-250 Celsius	2015-05-28	2016-05-28
□	3093-27	YAMARI	PT 100	KTC L 1560	5	1570317	-40-250 Celsius	2015-05-28	2016-05-28
■	4375-1	YAMARI	PT 100	-	0	837680	-40-250 Celsius	2015-05-28	2016-05-28
■	4375-2	YAMARI	PT 100	-	0	837681	-40-250 Celsius	2015-05-28	2016-05-28

Torque

Torque									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
■	3093-06	ONNOSOKKI	SS-201	-	-	2010359	0 - 200 Nm	2016-04-01	2016-05-01
□	3093-09	ONNOSOKKI	SS-501	-	-	5010499	0 - 500 Nm	2016-04-01	2016-05-01
□	3093-12	ONNOSOKKI	SS-102	-	-	1020158	0 - 1000 Nm	2016-04-01	2016-05-01
□	3336-01	ONNOSOKKI	SS-500	-	-	74302009	0 - 500 Nm	2016-04-01	2016-05-01
□	3338-01	ONNOSOKKI	SS-102	-	-	N/A	0 - 100 Nm	2016-04-01	2016-05-01

Torque Arm									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
□	3421	KBR	N/A	-	-	N/A	-	2014-07-01	2016-07-01

Weights									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
□	4835	SATORIUS	MSE70200S	-	-	32602042	0-70.2 kg	2015-03-06	2016-03-06

Power									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
□	3387	HIOKI	3169-20	-	-	3890	-	2015-05-29	2016-05-29

Speed

Speed									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
■	3093-07	ONNOSOKKI	MP-981	-	-	00303009	0-6000 r/min	2016-04-01	2016-05-01
□	3093-10	ONNOSOKKI	MP-981	-	-	00303101	0-6000 r/min	2016-04-01	2016-05-01
□	3093-13	ONNOSOKKI	MP-981	-	-	10304670	0-6000 r/min	2016-04-01	2016-05-01
□	3336-02	ONNOSOKKI	MP-981	-	-	N/A	0-6000 r/min	2016-04-01	2016-05-01
□	3308-02	ONNOSOKKI	MP-981	-	-	N/A	0-6000 r/min	2016-04-01	2016-05-01
□	3337	B&K	4912	-	-	Y0425N	-	2015-05-28	2016-05-28

Sound

Sound Pressure Level									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
■	3218-3	B&K	4228	-	-	2484517	-	2015-08-17	2016-08-17
■	3218-5	B&K	4942	-	-	2518399	-	2015-08-22	2016-08-22

Sound Power level									
	Asset	Manufacturer	Model	Facility	Plane	Serial Number	Scale Range	Last Calibration	Next Calibration
■	3218-1	B&K	4204	-	-	250111093	-	2013-01-31	2016-01-31