



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

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Test No. 33024-A1

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 #2DD**

Attached are the test results of the subject model performed on March 23, 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

33024-A1

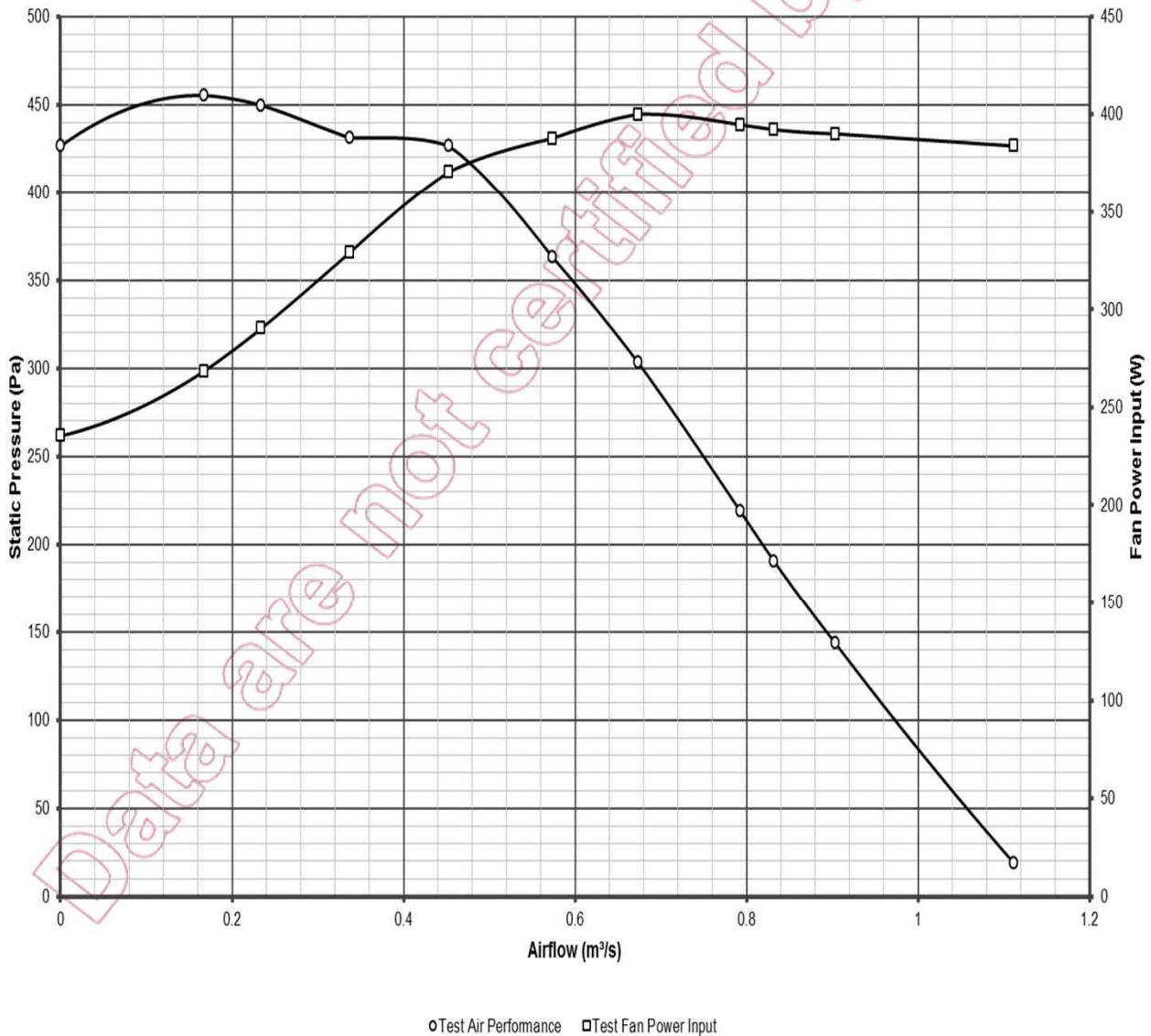
Test Unit: DWDI Centrifugal
 Manufacturer: Daeryun Ind. Ltd.
 Trade Name: DR-AF Series
 Model Number: DR-AF #2DD
 Impeller Diameter: 304 mm
 Inlet Area: 0.080 m²
 Outlet Area: 0.134 m²

Test Purpose: Contract Test
 Date of Test: March 23, 2016
 Client: Daeryun Ind. Ltd.
 Witness: No
 Personnel: KTC_HONG
 P_b: 102 kPa
 Unit System: SI

Test Method per ANSI / AMCA Standard 210-07, Figure 12 Setup, Installation Type B

Comments:

Results at Standard Air and Speed = 1800 rpm





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Results at Test Conditions:

Det. No.	ρ (kg/m ³)	N (rpm)	P_t (Pa)	P_v (Pa)	P_s (Pa)	Q (m ³ /s)	H (W)	K_p -	η_t (%)	η_s (%)
1	1.25	1799	62.78	42.78	20.01	1.11	398.6	1.0002	17.5%	5.6%
2	1.25	1799	177.39	28.23	149.16	0.90	405.0	0.9998	39.5%	33.2%
3	1.24	1799	221.10	23.89	197.21	0.83	406.2	0.9996	45.2%	40.4%
4	1.24	1799	248.59	21.66	226.93	0.79	408.8	0.9995	48.1%	43.9%
5	1.25	1799	330.94	15.66	315.28	0.67	415.4	0.9992	53.6%	51.0%
6	1.25	1799	388.43	11.36	377.07	0.57	402.6	0.9991	55.3%	53.6%
7	1.25	1799	450.24	7.08	443.16	0.45	384.9	0.9990	52.9%	52.1%
8	1.25	1799	451.98	3.92	448.07	0.34	341.6	0.9992	44.5%	44.1%
9	1.25	1799	468.98	1.89	467.09	0.23	301.4	0.9995	36.4%	36.2%
10	1.25	1799	473.85	0.97	472.88	0.17	278.8	1.0000	28.5%	28.4%
11	1.25	1799	443.06	0.00	443.06	0.00	244.3	0.9978	0.0%	0.0%

Results at Standard Air and Speed (N) = 1800 rpm:

Det. No.	P_t (Pa)	P_v (Pa)	P_s (Pa)	Q (m ³ /s)	H (W)	K_p -	η_t (%)	η_s (%)
1	60.44	41.18	19.26	1.11	384.0	1.0002	17.5%	5.6%
2	170.78	27.18	143.60	0.90	390.2	0.9998	39.5%	33.2%
3	213.43	23.06	190.37	0.83	392.3	0.9996	45.2%	40.4%
4	239.95	20.91	219.04	0.79	394.8	0.9995	48.1%	43.9%
5	318.56	15.07	303.49	0.67	400.1	0.9993	53.6%	51.0%
6	373.98	10.94	363.03	0.57	387.8	0.9991	55.3%	53.6%
7	433.38	6.82	426.57	0.45	370.7	0.9990	52.9%	52.1%
8	435.11	3.77	431.34	0.34	329.0	0.9992	44.5%	44.1%
9	451.48	1.82	449.66	0.23	290.3	0.9995	36.4%	36.2%
10	456.19	0.93	455.26	0.17	268.6	1.0000	28.5%	28.4%
11	426.54	0.00	426.54	0.00	235.4	0.9979	0.0%	0.0%



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Test Method per ANSI / AMCA Standard 210-07, Figure 12 Setup, Installation Type B

Comments:

Data at Test Conditions:

Det. No.	t _{d0} (°C)	t _{wo} (°C)	t _{d2} (°C)	t _{d5} (°C)	P _{s5} (Pa)	ΔP (Pa)	t _{d7} (°C)	P _{s7} (Pa)	N (rpm)	T (N·m)
1	11.6	8.0	12.0	12.0	20.01	805.62	0.0	20.01	1799	2.1
2	11.6	7.9	12.1	12.1	149.16	531.32	0.0	149.16	1799	2.2
3	12.1	9.7	12.7	12.7	197.21	449.54	0.0	197.21	1799	2.2
4	12.1	9.7	12.7	12.7	226.93	407.66	0.0	226.93	1799	2.2
5	11.6	7.9	12.1	12.1	315.28	294.89	0.0	315.28	1799	2.2
6	11.7	7.9	12.1	12.1	377.07	214.28	0.0	377.07	1799	2.1
7	11.6	7.9	12.2	12.2	443.16	133.86	0.0	443.16	1799	2.0
8	11.6	7.9	12.2	12.2	448.07	74.33	0.0	448.07	1799	1.8
9	11.6	7.9	12.2	12.2	467.09	36.09	0.0	467.09	1799	1.6
10	11.6	7.9	12.3	12.3	472.88	18.63	0.0	472.88	1799	1.5
11	11.7	7.9	12.3	12.3	443.06	441.01	0.0	443.06	1799	1.3

Open Nozzle Diameters (mm.):

Det. No.	Open Nozzle Diameters
1	200.0 mm
2	200.0 mm
3	200.0 mm
4	200.0 mm
5	200.0 mm
6	200.0 mm
7	200.0 mm
8	200.0 mm
9	200.0 mm
10	200.0 mm
11	All nozzles closed.



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Test Method per ANSI / AMCA Standard 210-07, Figure 12 Setup, Installation Type B

Comments:



**KTC INSTRUMENT LIST**

Test Number: 33024-A1

Date: 23-Mar-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 210-07

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	2016-03-01	2016-04-01
□	3093-09	ONNOSOKKI	SS-501	-	-	5010499	0 - 500 Nm	2016-03-01	2016-04-01
□	3093-12	ONNOSOKKI	SS-102	-	-	1020158	0 - 1000 Nm	2016-03-01	2016-04-01
■	3336-01	ONNOSOKKI	SS-500	-	-	74302009	0 - 500 Nm	2016-03-01	2016-04-01
□	3338-01	ONNOSOKKI	SS-102	-	-	N/A	0 - 100 Nm	2016-03-01	2016-04-01

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	2016-03-01	2016-04-01
□	3093-10	ONNOSOKKI	MP-981	-	-	00303101	0-6000 r/min	2016-03-01	2016-04-01
□	3093-13	ONNOSOKKI	MP-981	-	-	10304670	0-6000 r/min	2016-03-01	2016-04-01
■	3336-02	ONNOSOKKI	MP-981	-	-	N/A	0-6000 r/min	2016-03-01	2016-04-01
□	3308-02	ONNOSOKKI	MP-981	-	-	N/A	0-6000 r/min	2016-03-01	2016-04-01
□	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