

Test Report

Korea Energy Appliances Industry Association (KEAA)

Address : 535-4, Jangsang-dong, Sangnok-gu, Ansan-si, Gyeonggi-do, Korea

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Issue No : 10-23

Page No : 1 of 6

1. Applicant

- Company Name : AOG System Co.
- Address : #1506 Hyundai Reksion, 719-2, Banghak 1-dong, Dobong-gu, Seoul, Korea
- Date of Application : Dec. 11, 2009

2. Purpose : quality control

3. Name of Sample : AOG Ondol Jangkun

4. Receipt No. : 09-489

5. Test Period : Feb. 07~ Feb. 11, 2010

6. Test Method : Refer to the attached test sheet.

7. Test Result : Refer to the attached test sheet.

This test report is based on the sample supplied by the applicant, and it is strictly prohibited to use it for other than its intended purposes.

Confirmed by : Inspector's Name : Seung Jo, Yun

Approved by : Position : technical manager / Name : Sae Jong, Park
Feb. 16, 2010

Korea Energy Appliances Industry Association (KEAA)

Test Sheet

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Test Item		Test Data		Remark
Comparative Test of Heat Performance between Dry & Wet type Ondul Panels		Wet type	Dry type	
3 hours' operation/ 3 hours' stop (4 times/day)	Cumulative gas volume(m ³ /V)		1.4466	0.8660
	Time to set temp.(22°C)		1h 16min	35min
	Indoor Temp.(°C)	Initial	12.8	12.7
		Highest	25.4	27.1
		Average	22.7	21.3
		Temp. deviation	4.7	9.5
	Floor Temp. (°C)	Highest	29.8	41.3
		Average	24.6	22.6
6 hours' operation/ 6 hours' stop (2 times/day)	Cumulative gas volume(m ³ /V)		1.4930	1.0186
	Time to set temp.(22°C)		1h 33min	44min
	Indoor Temp.(°C)	Initial	9.2	9.1
		Highest	25.4	26.6
		Average	21.4	20.6
		Temp. deviation	6.9	11.2
	Floor Temp. (°C)	Highest	30.4	40.9
		Average	23.3	22.1
12 hours' operation/ 12hours' stop (1 time/day)	Cumulative gas volume(m ³ /V)		1.7043	1.1188
	Time to set temp.(22°C)		1h 52min	50min
	Indoor Temp.(°C)	Initial	9.2	9.3
		Highest	24.6	25.2
		Average	20.4	19.4
		Temp. deviation	2.9	3.7
	Floor Temp. (°C)	Highest	30.8	40.4
		Average	22.6	21.1

Remark :1. This test sheet applies only to the sample supplied by the applicant, not to all of the product.

2. A copy of this test sheet is invalid, and it can not be reissued without approval by the president of KEAA.

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Remark : 3. Test conditions and test methods

3.1 Test conditions

3.1.1 Heat source (gas boiler)

- Capacity : 11.6 KW (10,000 kcal), quantity : 2 units
- Equivalence evaluation : gas consumption volume, indoor temperature controller

3.1.2 Laboratory

- The structure of wall and ceiling should be airtight and the interior should be flat.
- There will be no artificial ventilation or air flow except natural air flow.
- Floor conditions of the dry laboratory : as per the manufacturer's specifications. reflective insulation (0.5mm), panels (15mm)
- Floor conditions of the wet laboratory : applied heating plumbing (50510) of the Korea Land and Housing Corporation (standard floor type 5).
- Floor finishing materials of the laboratory : applied KS M 3802 PVC (vinyl) flooring.

3.1.3 Test period and temperature setting

- Test days : 1 day in each case, total 3 days
- Temperature of supplied hot-water : below 80°C
- Indoor set temperature : 22°C
- Indoor initial temperature : applied the temperature at the start of test.
- Quantity of flow (each laboratory) : 2.7~ 3.1L/min
- Other indoor conditions : With all doors closed, there will be no artificial ventilation or air flow except natural air flow.

3.2 Test methods

- Operating time of a gas boiler.

Description		Operating time	Remark
Intermittent heating	Case 1	3 hours' operation/ 3 hours' stop (4 times a day)	
	Case 2	6 hours' operation/ 6 hours' stop (2 times a day)	
Continuous heating	Case 3	12 hours' operation/ 12 hours' stop	

- Measurement of quantity of flow : measured at the place of collection.
- Measurement of temperature
 - Temperature of hot-water : measured at the place of supply and collection.
 - Indoor temperature : measured at the place where a controller is located.
 - Floor surface temperature : measured in between pipes.
- Measurement frequency : gas volume ; 30 seconds, indoor temperature ; 1 minute.

3.3 Test period is 1 day in each test condition.

Page No : 3 of 6.

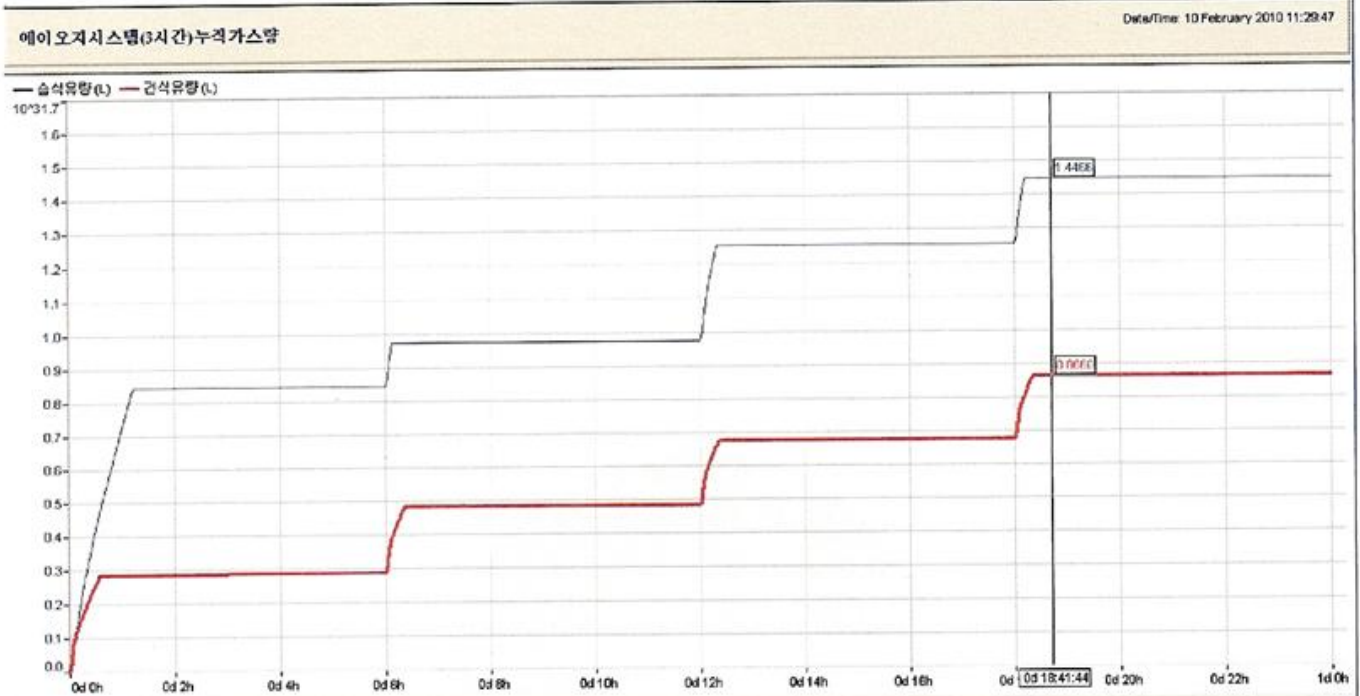
Test Sheet

Issue No : 10-23

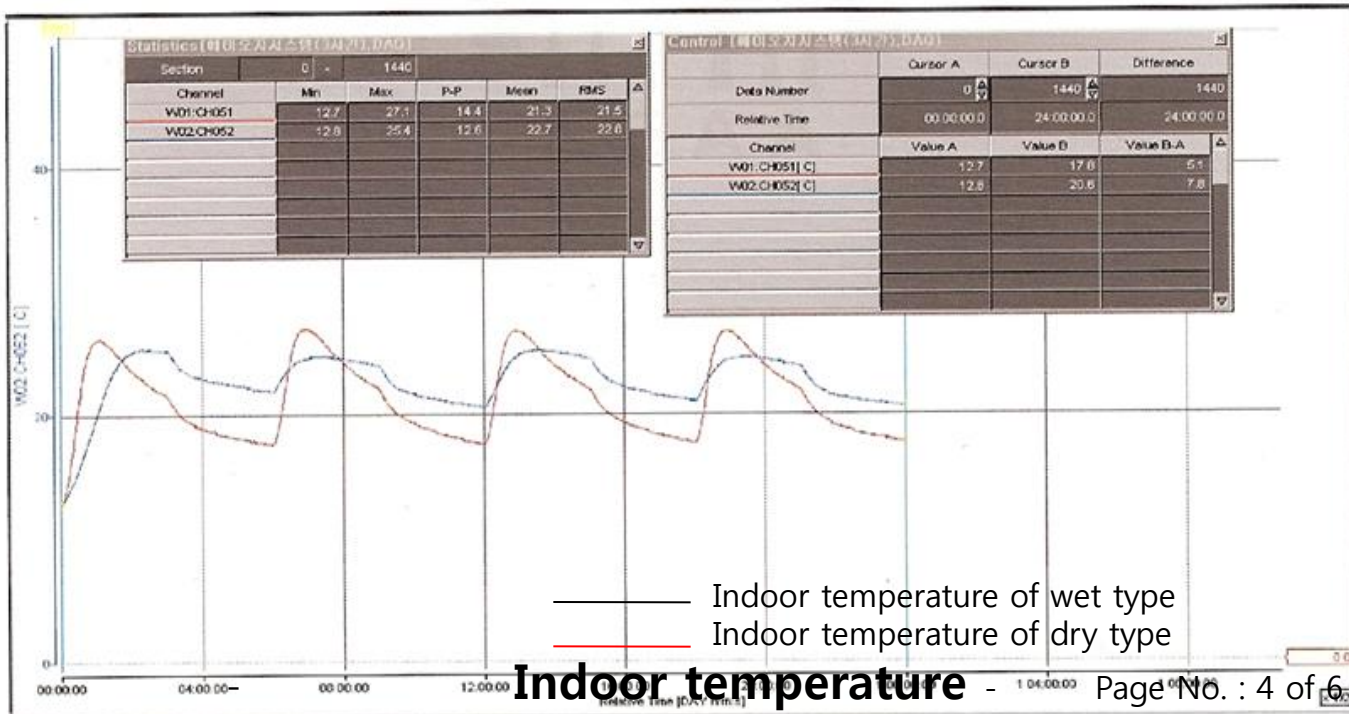
Receipt No : 09-489

Remark : 4. Photographs

- 3 hours' operation / 3 hours' stop



——— Gas volume of wet type
——— Gas volume of dry type
- Cumulative gas volume -



——— Indoor temperature of wet type
——— Indoor temperature of dry type

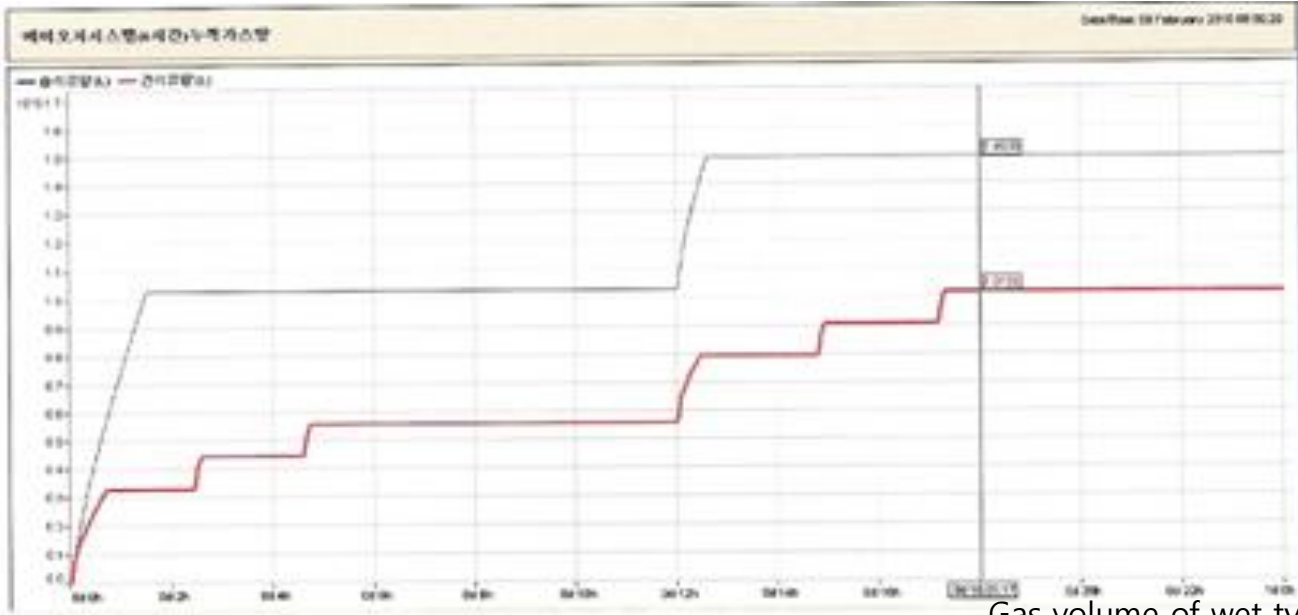
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Issue No : 10-23

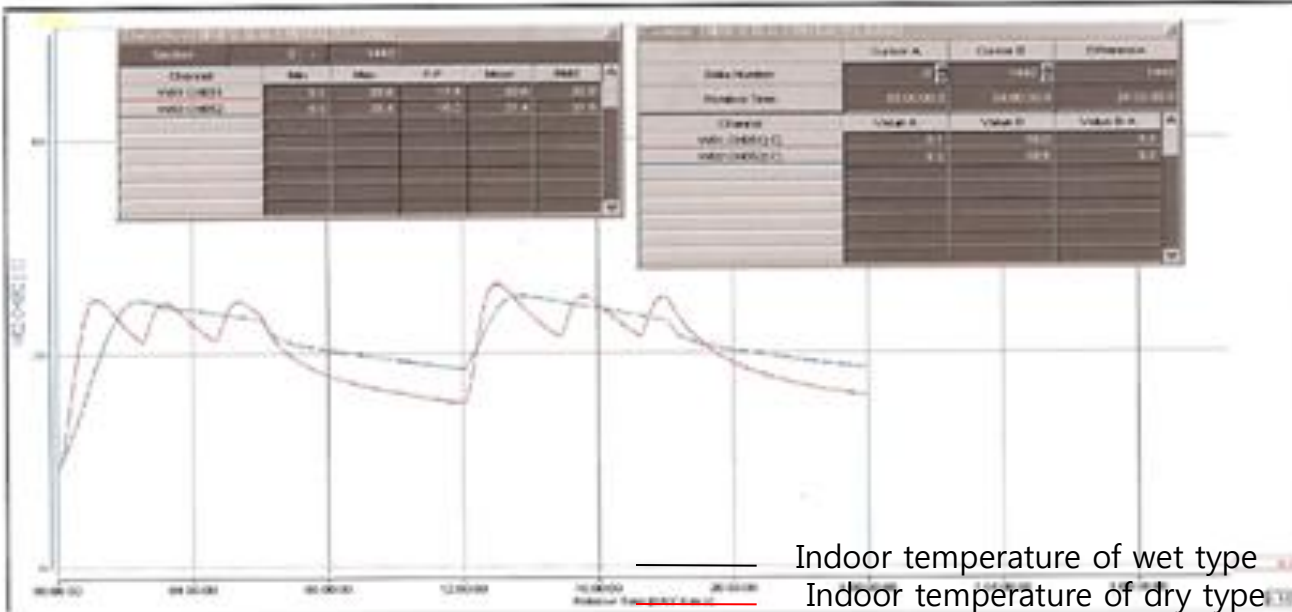
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Remark : 4. Photographs

- 6 hours' operation / 6 hours' stop



- Cumulative gas volume -



- Indoor temperature -

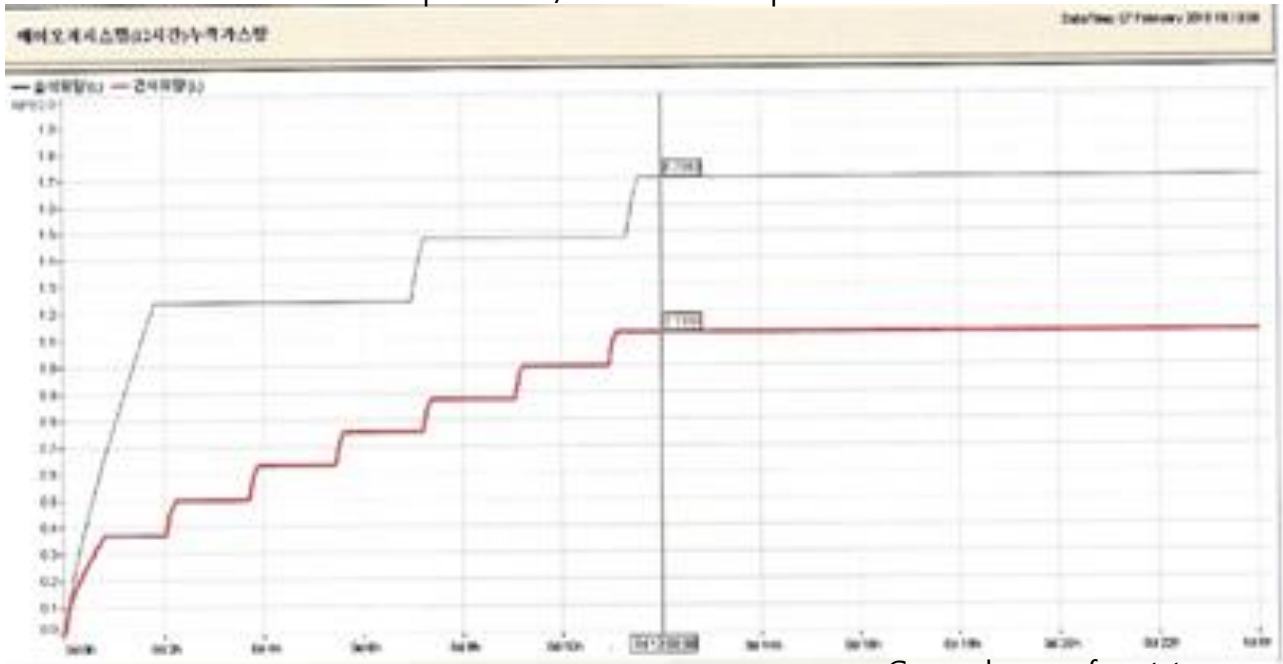
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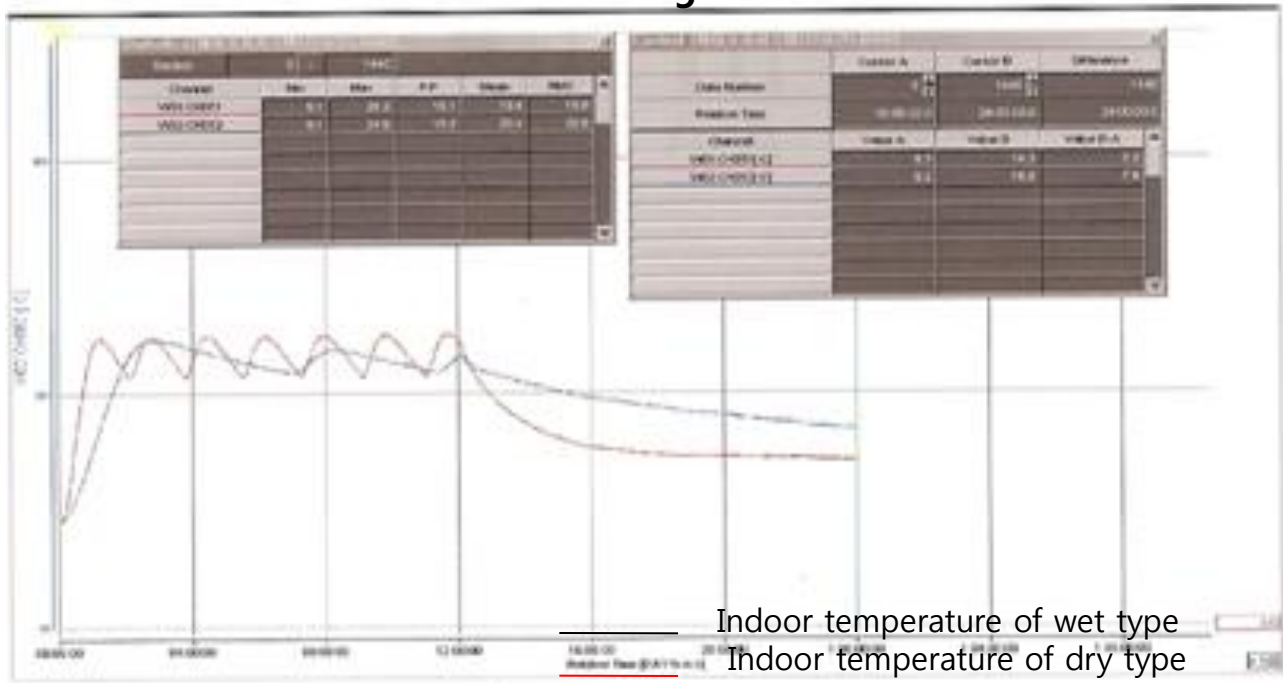
Remark : 4. Photographs

- 12 hours' operation / 12 hours' stop



Gas volume of wet type
Gas volume of dry type

- 누적가스량 -
- Cumulative gas volume -



Indoor temperature of wet type
Indoor temperature of dry type

- Indoor temperature -