TESTING RESULTS

Performance of the airAC 300.1 ERV device

1. Testing procedure

Enthalpy recovery ventilator (ERV) of airAC type model 300.1 (MG Innovations Ltd., Finland) was tested on its performance at the laboratory of Yamatake Corp., Tokyo, Japan, in November 2007. The device as supplied is shown in Fig-1. Test installation in the climate laboratory is shown in Fig-2. Besides air ducts, airflow sensor, power meters and computer controlled sensors with data acquisition system has been installed.

Fig-1. ERV airAC model 300.1

Fig-2. Testing layout picture.

Testing conditions were set based on JIS specifications below with the respective set points and an additional testing case for subzero outside air temperature:

Table-1. Testing conditions of JIS Specification

Climate	Outdoor		Indoor	
	DB Temperature [ºC]	WB Temperature [ºC]	DB Temperature [ºC]	WB Temperature [ºC]
Winter	5±1	2±2	20±1	14±2
Summer	35±1	29±2	27±1	20±2

Table-2. Testing conditions of airAC 300.1 ERV

Test	Outdoor		Indoor	
	DB Temperature [ºC]	Relative Humidity [%]	DB Temperature [ºC]	Relative Humidity [%]
Case 1	-5	60*	18	30*
Case 2	5	59*	20	52*
Case 3	35	64*	27	53*

* Wet-bulb temperature had been converted to relative humidity at 1 atm.

During the tests, the following parameters have been measured and recorded:

- Fan power consumption at different speeds
- Air flow rate (speed IV ~100% and speed III ~75% of maximal rated airflow)
- External static pressure (with and without air flow sensor)
- Air flows temperature and relative humidity variations

Additionally, humidity ratio, thermal, latent and total efficiencies have been calculated. As there is difference between efficiency definition by ASHRAE and JIS (the former gives higher values by 1~10% in the case of different supply and return air flows), JIS definition was used which represents the minimal value. Exact data and full results of the tests are available from Yamatake Corp.

2. Testing results

The summary of the airAC 300.1 ERV performance against the specifications and in the tests is shown below:

Table-3. Airflow Comparison of Spec. and Result

airAC 300.1	Specification	Result of Test
Airflow Rate [m^3/h]	360	327
External Static Pressure [Pa]	250	91
Power [W]	380 (230V AC)	216 (240V AC, 50Hz)

Table-4. Efficiency Comparison of Spec. and Result

Exchange Efficiency	Specification	Result of Test			
		Include Air Temp.-rise		Deducted Air Temp.-rise	
		Winter	Summer	Winter	Summer
Sensible Heat		1.00	0.62	0.88	0.81
Latent Heat		0.69	0.67	0.69	0.67
Total Heat	0.76~0.90	0.89	0.66	0.82	0.71
Airflow Rate	360 m^3/h	244 m^3/h	323 m^3/h	244 m^3/h	323 m^3/h

3. Conclusions

1. The tested ERV airAC 300.1 device provides in winter sensible recovery efficiency 1.00, latent 0.69, total 0.89, and in summer sensible 0.62, latent 0.67 and total 0.66 (the temperature rises caused by selected fans are accounted), which is slightly lower than the specifications provided by the manufacturer (0.76~0.90).

2. AirAC 300.1 has been demonstrated less power consumption than specified (maximal 216W vs. 380W) and respectively lower external static pressure (91 vs. 250 Pa) at compatible airflow rates. It was considered as the manufacturer showed the external static pressure of the fan, but the test result showed the external static pressure of the airAC 300.1 package.

3. AirAC 300.1 efficiency values are higher than competitive ERV units available at Japanese market (even when the air temperature rise due to fan losses has been deducted):

Table-5. Specification Comparison with Other Manufacturer

Manufacturer	Product	Media Material	η_t (Summer)	η_t (Winter)	Airflow Rate (CMH)
Mitsubishi	Lossnay	Paper	0.64	0.67	350~2000
Daikin	HRV-VAM	Paper	0.65		350~2000
Panasonic	HEX	Paper	0.62	0.67	350~1000
Kyoritsu	HEC	Paper	0.58	0.62	500
Fläkt	EconoVent V	Aluminum	0.70		1500~2000
MGI	airAC	Aluminum	0.66 (0.71*)	0.89 (0.82*)	360~3300

* The air temperature-rises of fans are deducted.