MEASUREMENTS

AIRREX AH-300

REX NORDIC OY

Kymenlaakso University of Applied Sciences
KymiLabs, Emission measurement service
Pääskysentie 1, P.O. Box 9,
FI-48401 KOTKA

Tel. +35844 702 8888

firstname.lastname@kyamk.fi

www.kyamk.fi/kymilabs

1. MEASUREMENT TARGETS AND OBJECTIVE

The objective of the measurements was to analyse the combustion gas emissions of AIRREX AH-300 infrared radiation heater imported by Rex Nordic Oy with three different fuels. The fuels were diesel oil, fuel oil and biodiesel. The following concentrations were measured in the combustion gas emissions:

- Carbon monoxide concentration (CO)
- Nitrogen oxide concentration (NOx)
- Oxygen concentration (O2)
- Carbon dioxide concentration (CO2)
- Temperature of combustion gas emissions
- Humidity of combustion gas emissions

The measurements were conducted by running the heater on full power on 25 February 2015.

2. MEASUREMENT RESULTS

2.1 Measurement results with diesel oil

Table 5. O2 and CO2 and average temperature of exhaust gases

O_2	O_2	CO_2	CO_2	TEMP	Humidity
%	Uncertainty	%	Uncertainty	°C	%
7,3	± 0,2 % pp	**9,6**	± 0,2 % pp	**418***	**8,8**

Concentrations in dry gases

Table 6. Average results calculated from the measurements

Component	ppm	mg/m^3(n)		Emission mg/h
			Uncertainty	
CO	**1**	**1**	± 10 %	**18**
NOx	**89**	**183**	± 10 %	**3294**

All concentrations in dry gases

2.2 Measurement results with fuel oil

Table 5. O2 and CO2 and average temperature of exhaust gases

O_2	O_2	CO_2	CO_2	TEMP	Humidity
%	Uncertainty	%	Uncertainty	°C	%
6,7	± 0,2 % pp	**10,0**	± 0,2 % pp	**415***	**8,8**

Concentrations in dry gases

Table 6. Average results calculated from the measurements

Component	ppm	mg/m^3(n)		Emission mg/h
			Uncertainty	
CO	**1**	**1**	± 10 %	**18**
NOx	**95**	**195**	± 10 %	**3510**

All concentrations in dry gases

2.3 Measurement results with biodiesel

Table 5. O2 and CO2 and average temperature of exhaust gases

O_2	O_2	CO_2	CO_2	TEMP	Humidity
%	Uncertainty	%	Uncertainty	°C	%
6,6	± 0,2 % pp	**10,0**	± 0,2 % pp	**407***	**8,8**

Concentrations in dry gases

Table 6. Average results calculated from the measurements

Component	ppm	mg/m^3(n)		Emission mg/h
			Uncertainty	
CO	**1**	**1**	± 10 %	**18**
NOx	**98**	**201**	± 10 %	**3618**

All concentrations in dry gases

* The exhaust gas temperature was measured immediately after it exited the device, approximately 1 cm distant from the device. The exhaust gas temperature measured in the flue 1 metre from the device was 190 °C. The fuel consumption reported by the manufacturer for Airrex AH-300 is 1.38–1.60 l/h. The emissions have been calculated based on the theoretical air volume.

3. CONDITIONS

Average air temperature, pressure and humidity were measured using a calibrated measuring instrument.

Date	25.2.2015	Unit
Temperature	19,5	°C
Pressure	101,2	kPa
Humidity	27,5	%- RH

4. MEASUREMENT METHODS

The following methods and standards were used for the continuous measurements:

Component	Method	Standard
NO_x	Chemiluminescence	concentrated SFS 5624
CO	IR absorption	concentrated SFS 5624
CO_2	IR absorption	concentrated SFS 5624
O_2	Paramagnetic	concentrated SFS 5624

5. THE MEASURING INSTRUMENTS USED

Component	Instrument	Range	Calibration gas
NO_x	HORIBA PG 350	0 – 2500 ppm	0 / 400 ppm
CO	HORIBA PG 350	0 – 5000 ppm	0 / 500 ppm
CO_2	HORIBA PG 350	0 – 30 %	0 / 8,0 %
O_2	HORIBA PG 350	0 – 25 %	0 / 20.9 %
Temperature	FLUKE thermo		

The measuring instruments have been calibrated and linearity-tested.