

MEASUREMENTS

AIRREX AH-300

REX NORDIC OY

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
NO_x	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.