

**Test Report**  
**On**  
**Stack Air Emission Analysis of Generator**  
Prepared For  
**Vertex RMG Division**  
**Vertex Wear Limited, Dress World Limited, Neo Fashion Limited**

Varari, Rajfulbaria, Tetuljhora, Hemayetpur, Savar, Dhaka, Bangladesh.

**Report No. XSG-3RECL-2018-1053**



**Prepared by**



**Stack Air Emission Analysis of Generator  
At  
Vertex RMG Division  
Vertex Wear Limited, Dress World Limited, Neo Fashion Limited**

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<b>Report No.</b>	XSG-3RECL-2018-1053
<b>Sampling Date</b>	May 05, 2018
<b>Sampling Time</b>	12:00 p.m.-12:30 p.m.
<b>Reporting Date</b>	May 08, 2018

<b>Basic Information of Generator</b>	
Location	Ground Floor, Utility Building
Brand	PERKINS
Model	P1250P3
Serial Number	FGNRPES6HMAP00940
Fuel Type	Diesel (Light Oil)
Capacity	1250 KVA
RPM	1500
Voltage	400 V
Frequency	50 Hz
Manufacturing Date	Not Found
Last Servicing Date	21/04/2018
Physical Structure	Horizontal Landed

<b>Environmental Conditions</b>	
<b>Temperature</b>	29.5°C
<b>Humidity</b>	61.2% RH
<b>Visibility/Season</b>	Summer & Sunny Atmosphere

## Description of Instruments

A calibrated direct reading instrument designed to measure the stack parameters was used with following specifications.

Temp Measurement	Resolution	Range	Accuracy
Flue Temperature	0.1° (C/F)	0-1100°C 32-2140°F	1.0° C ±0.3% of reading
Inlet Temperature	0.1° (C/F)	0-600°C 0-999°F	1.0° C ±0.3% of reading
Gas Measurement <sup>*1</sup>	Resolution	Range	Accuracy
Oxygen (O <sub>2</sub> ):	0.01%	-	-0.1% +0.2%
Carbon monoxide (CO): (standard: H compensated)	1ppm	<100ppm >100ppm <2000ppm >2000ppm <4000ppm	+/-5ppm +/-5% of reading +/-10% reading
Nitric oxide (NO): (high range0)	1ppm	<100ppm >100ppm <1000ppm >1000ppm <5000ppm	+/-5ppm +/-5% of reading +/-10% reading
Nitric oxide (NO) (low range)	1ppm	<100ppm >100ppm <300ppm	+/-5ppm +/-10% of reading
Nitrogen dioxide (NO <sub>2</sub> ):	1ppm	<100ppm >100ppm <1000ppm	+/-5ppm +/-10% of reading
Sulphur dioxide (SO <sub>2</sub> ) (low range):	1ppm	<100ppm >100ppm <500ppm	+/-5ppm +/-10% of reading
Sulphur dioxide (SO <sub>2</sub> ) (high range):	1ppm	<100ppm >100ppm <2000ppm >2000ppm <5000ppm	+/-5ppm +/-5% of reading +/-10% reading
Hydrogen sulphide (H <sub>2</sub> S):	1ppm	<100ppm >100ppm <200ppm >200ppm <300ppm	+/-5ppm +/-5% reading +/-10% of reading
Gas Measurement <sup>*1</sup>	Resolution	Range	Accuracy
Pressure	0.01mbar	0-150 mbar	± 0.5% Full Scale
Carbon dioxide (CO <sub>2</sub> ) <sup>*2</sup>	0.1%	0 – Fuel Value	± 0.3%
Efficiency <sup>*2</sup>	0.1%	0-100%	± 1%
<b>Ambient operating range</b>		-10°C to + 55°C/< 85% RH non condensing	

<sup>\*1</sup> using dry test gases at STP

<sup>\*2</sup> calculated

## Method of Sampling

Analysis of the exhaust flue was done using direct reading instruments. So, there was no separate sampling used for this analysis. During the analysis, a standard work instruction stated in the SWI-03 was followed.

## Method of Analysis

The following methods were used to analyze the stack emission parameters.

Parameters	Methods
SO <sub>2</sub> (Sulfur Dioxide)	Electrochemical
CO (Carbon Monoxide)	Electrochemical
CO <sub>2</sub> (Carbon Dioxide)	Calculated
O <sub>2</sub> (Oxygen)	Electrochemical
NO <sub>x</sub> (Oxides of Nitrogen)	Calculated
SPM (Suspended Particulate Matter)	Laser
Flue Temperature	Thermocouple
Flue Pressure	Pressure Sensor

## Measurement Uncertainties

The following measurement uncertainties were assigned to the respected parameters.

<b>Gases</b>	±2%
<b>Temperature</b>	2°C
<b>Pressure</b>	0.05%

## Team

All the experiments and reporting have been done under the supervision of **Mohammad Kabir Hossain** (MSc in Environment & Sustainable Technology, Manchester, UK).

### Team members involved in field experiments and reporting:

- ❖ **Md. Sarwar Kabir** (BSc in Electrical and Electronics Engineering)  
Chief Technical officer, 3R Environmental Consulting Limited
- ❖ **Md. Golam Rabbani** (BSc & MSc in Environmental Science)  
Lab Analyst, 3R Environmental Consulting Limited
- ❖ **Mohammad Mosarof Hossain**  
Assistant Technical officer, 3R Environmental Consulting Limited

## Results of Analysis

Result of analysis is expressed in the following table:

Observations	Parameters						
	SPM	CO	CO <sub>2</sub>	SO <sub>2</sub>	NO	NO <sub>x</sub>	O <sub>2</sub>
	µg/m <sup>3</sup>	mg/m <sup>3</sup>	%	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>	%
<b>Run-01</b>							
01	129	442	2.9	71	159	162	12.05
02	124	449	2.8	67	161	163	12.03
03	131	439	2.9	73	163	166	12.05
<b>Run-02</b>							
01	136	395	2.9	69	159	161	12.08
02	139	401	2.7	72	164	166	12.07
03	135	399	2.8	68	158	160	12.10
<b>Run-03</b>							
01	133	366	2.9	66	162	165	12.13
02	134	370	3.0	67	160	163	12.15
03	130	375	2.9	73	165	168	12.13

Reference Standards					
Parameters	SPM	CO	CO <sub>2</sub>	SO <sub>2</sub>	NO <sub>x</sub>
Units	µg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>	mg/m <sup>3</sup>
DOE Standard (National)	100 (Gas) 300 (Oil)	NYS	NYS	NYS	150 (Gas) 300 (Oil)
World Bank/ IFC Standard (International)	NYS (Gas) 50 (Liquid)	NYS	NYS	NYS (Gas) 2000 (Liquid)	320 (Gas) 460 (Liquid)

**\*NYS= Not Yet Set**

**Expert's Comments and Recommendations**

The Stack Emission from the stack point of the GENERATOR has been analyzed for the parameter of SPM, CO, CO<sub>2</sub>, SO<sub>2</sub>, NO, NO<sub>x</sub> and O<sub>2</sub> to evaluate the effect of the plant's emission while running on 100% **Diesel (Light Oil)** on the air environment. From the analysis, it has been observed that the factory emission of SPM, CO, CO<sub>2</sub>, SO<sub>2</sub>, NO, NO<sub>x</sub> and O<sub>2</sub> is within the standard limit of DoE or IFC/World Bank. To meet up all standards, proper and timely maintenance of Generator is highly recommended. Use of better quality fossil fuel, Installment of proper and enough ventilation system (Exhaust Fan) will surely help to reduce emission.

**Prepared by**

**Checked by**

**Approved by**

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