



**Stack Air Emission Report of Generator-1:**

**Mondol Intimates Ltd.**



**Report Prepared BY:  
Greentech Testing Company Ltd.**

**Date of Testing: April 15, 2017**

**Date of Report Submitting: April 20 2017**



# GREENTECH TESTING COMPANY

Environmental Testing, Inspection, Assessment, Calibration  
& Consultancy Organisation.



Certificate Number: GT ET/VER/17/2232

## Stack Air Emission Report

**Issued By** : Greentech Testing Company Ltd.  
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**Date of Issue** : April 20, 2017

**Certificate Number** : Certificate Number: GT ET/VER/17/2232

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**Customer** : **Mondol Intimates Ltd.**  
Shirir Chala, Bager Bazar, Gazipur, Bangladesh.

**Description** : Stack Air Emission Assessment of Generator.  
(Included Parameter: Oxygen(O<sub>2</sub>), Carbon  
Monoxide(CO), Carbon Dioxide(CO<sub>2</sub>), Nitric  
Oxide(NO), Nitrogen Dioxides(NO<sub>2</sub>),  
Methane(CH<sub>4</sub>), Sulfur Dioxide (SO<sub>2</sub>))

**Date of Assessment** : April 15, 2017

**Prepared By:**

**Approved By:**

Ms. Sadia Afrin Nitol  
Environmental Specialist  
Head of- Quality Assurance



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## Stack Air Emission Report

### Description of Sampling:

Name of Combustion Unit: Generator (Diesel)

Key Information of Generator	Generator
Location of Generator	Ground floor, Main Building
Capacity	280KW
Brand Name	Perkins
Supplier Name	Bangla Cat
Model	NGEP400-3
Serial No.	OLYOOOOOJB500336
Frequency	50 Hz
Volts	400/230V
Manufacturer Year	2012
Origin	UK
Relevant Weather Condition	
Temperature of Generator Room	33.38°C
Humidity of Generator Room	63% RH
Ambient Weather	Normal

\*N/F= Not Found

Sampling has been done by automatic sampler connected with the analyzer. During the sampling procedure, all instruction stated in the Greentech Testing Company Ltd. work instruction GT-101 has followed. The machine probe has set to the center point of the exhaust. Sampling has been conducted for specific time intervals mentioned in the work instruction and recorded in a field data collection sheet.

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## Description of Methods:

All the tests have been performed using continuous Stack Emission Monitoring (CEMS) test methods. KANE-940 continuous analyzer was used to monitor CO, SO<sub>2</sub>, CO<sub>2</sub>, NO and NO<sub>x</sub>. The analyzer is designed to meet the BS EN 50319 standard method. CO, NO and SO<sub>2</sub> is measured using electrochemical sensors and CO<sub>2</sub> is measured using Non-Dispersive Infra-Red (NDIR) method.

## Description of Instruments:

Parameter	Resolution	Accuracy	Range
Temp Measurement Flue with Probe Inlet temperature	1.0 °C/F 0.1 °C/F	± 2.0°C±0.3%reading ±1.0°C±0.3%reading	0-600°C 32-1112°F 0-50°/32-122°F
Pressure	0.01mbar	± 2% of full scale	+ 150mbar to150mbar
Gas Measurement Carbon Monoxide (Standard compensated)	0.1% 1ppm	± 2% ± 20ppm<400ppm ±5%<5000ppm ±10%>5000ppm	0-21% 0-10000ppm
Carbon Monoxide (high range)	0.01%	±5% reading from 0.1% to 10%	0-10%
Nitric Oxide (Standard)	1ppm	±5ppm<100ppm ±5%>100ppm	0-5000ppm
Nitric Oxide (Low Range)	1ppm	±2ppm<30ppm ±5ppm>30ppm	0-100ppm
Nitrogen Dioxide	1ppm	±5ppm<100ppm ±10ppm<500ppm ±5%500ppm	0-1000ppm
Sulphur Dioxide	1ppm	±5ppm<100ppm ±5%>100ppm	0-5000ppm
Ambient Operating Range		0°C to 45°C/10% to 90%RH non condensing	

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## Instrument Calibration:

The temperature probe has been calibrated by temperature simulator EX/R/117. The CO<sub>2</sub> sensor has calibrated by using CO test gas, CO standard certified gas, the CO sensor has calibrated by ambient air and standard gas for both lower and higher detection limit. No sensor is calibrated by ambient air and standard certified gas for both lower and higher detection limit respectively. The pressure sensor has calibrated by dead wrights taster and E/C/100 for both lower and higher detection limit respectively. The measured flow rate is tested by TL529 and pump suction is calibrated by EX/X/186.

## Measurement Uncertainties:

The uncertainty assigned above measurement is 2 °C for temperature, ±2% gas measured and 0.05% for pressure.

## Result:

Run (10 Minutes interval)	Measured pollutants					
	CO Mg/Nm <sup>3</sup>	CO <sub>2</sub> %	NO Mg/Nm <sup>3</sup>	NOx Mg/Nm <sup>3</sup>	SO <sub>2</sub> Mg/Nm <sup>3</sup>	O <sub>2</sub> %
Run-1	1090	5.1	276	239	233	12.3
Run-2	1010	5.1	243	238	246	12.4
Run-3	1046	5.1	232	237	238	12.2
Run-4	1047	5.1	287	230	257	12.3
Run-5	1002	5.1	277	238	238	12.4
Run-6	1063	5.1	292	238	243	12.3

Flue Temperature	510 °
Differential Flue Pressure	0.13 mbar
P Index	2.25
Excess Air	12.4

## Standard Permissible Limit:

Agency	Pollutants			
	CO Mg/Nm <sup>3</sup>	CO <sub>2</sub> %	NOx Mg/Nm <sup>3</sup>	SO <sub>2</sub> Mg/Nm <sup>3</sup>
DOE	NYS	NYS	150 (GAS) 300 (OIL)	NYS
US EPA	NYS	NYS	150 (GAS) 300 (OIL)	NYS
World Bank	NYS	NYS	320 (GAS) 460 (Liquid)	NYS (GAS) 2000 (Liquid)

\*NYS= Not Yet Set

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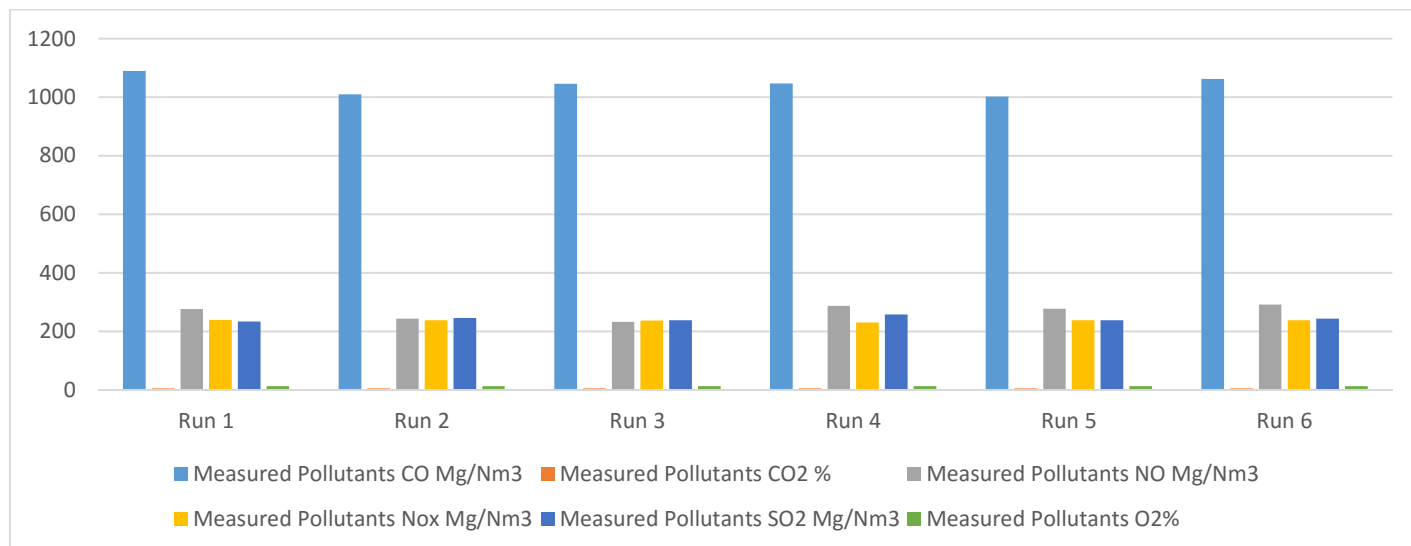
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## Graphical Presentation of Results:



Graph 1: Graph of emitted gases (CO, SO<sub>2</sub>, CO<sub>2</sub>, NO, NO<sub>x</sub> and O<sub>2</sub>) for 60 Minutes

## Suspended Particulate Matter (SPM):

Run (10 Minutes interval)	Suspended Particulate Matter ( $\mu\text{g}/\text{m}^3$ )						Total Suspended Particles, TSP( $\leq 10\mu\text{M}$ )
	PM 0.3	PM 0.5	PM 1.0	PM 2.5	PM 5	PM 10	
Run-1	2	1	1	26	28	27	85
Run-2	2	1	1	27	25	23	79
Run-3	1	0	0	31	29	32	93
Run-4	2	1	1	30	28	27	89
Run-5	1	1	1	30	27	28	88
Run-6	2	1	1	27	29	26	86

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Agency	Pollutants Concentration						
	NO	H <sub>2</sub> S			VOC	Hydrocar bon	O2
ECR97, Schedule 2, Amendment 2005	NYS	NYS			NYS	NYS	NYS
US EPA	NYS	<b>AEGL 1</b>			NYS	5% (Assuming a Methane environm ent)	NYS
		<b>AEGL 2</b>					
		<b>AEGL 3</b>					
		0.33					
		17					
31							
For 8 Hour Monitoring							
*AEGL- Acute Exposure Guidelines Levels. (AEGLs), which is indicate the concentrations of the chemical in air above which different types of health effects could begin to occur in an environment. AEGL 1< there may be some discomfort, odor, irritation, but effects, if any, are not impairing and only temporary. AEGL 2< effects become more significant and may impair ability to escape, be long lasting, or permanent. AEGL 3< increasingly severe effects and possible death without treatment.							
OSHA	25 ppm	20 ppm (50 ppm for 10 min once if no other measurable exposure occurs.)			NYS	NYS	19.5 – 22 % (for employee) 19.5 – 23.5 % (Atmospheric)

\*NYS – Not Yet Set

## Suspended Particular Matter (SPM) Standard limit

Agency	SPM Density
According to ECR 97 (Amendment 2005), Schedule-2	SPM: 200 µg/m <sup>3</sup> (8hr Average) PM 2.5: 15 µg/m <sup>3</sup> (Annual Average) 65 µg/m <sup>3</sup> (24 hour Average) PM 10: 50 µg/m <sup>3</sup> (Annual Average) 150 µg/m <sup>3</sup> (24 hour Average)
US EPA	PM 2.5-35 µg/m <sup>3</sup> (24-hr) PM 10-150 µg/m <sup>3</sup> (24-hr)

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## Discussion and Recommendation:

Stack air emission of "Mondol Intimates Ltd. "of Generator factory has been analyzed for the concentration of parameters CO, CO<sub>2</sub>, NO<sub>2</sub>, CH<sub>2</sub>O and SO<sub>2</sub>. The concentration of Suspended Particulate Matter (SPM) of different sizes within the range of 0.3 up-10 um has also measured. From the analysis it has been observed that in most of the sections the value of CO, CO<sub>2</sub>, NO<sub>2</sub>, CH<sub>2</sub>O & SO<sub>2</sub> are within the maximum permissible limit of ECR 97 Schedule 2 (amendment 2005), US EPA and OSHA guidelines. The Particulate Matter Concentration of some area has exceeded the optimum SPM limit according to ECR97, thus it is recommended to provide mask to the relevant workers of those sections to avoid occupational health hazard. The Oxygen present in the stack emission of Generator found within the acceptable limit.

1. The Carbon Monoxide is within the limit for **Generator**.
2. The amount of Nitrogen Dioxide present in the **Generator** is not more than the acceptable Limit.
3. Carbon Dioxide found within the acceptable limit in **Generator**.
4. Methane found within the permissible limit in **Generator**.
5. Nitric Oxide found not more than the acceptable limit in **Generator**.
6. Sulfur Dioxide Found within the DOE and EPA limit in all area.

For obtaining above result the recommendation are given below:

1. **Factory has to check Air Emission quality once in a year.**

**Approved By:**

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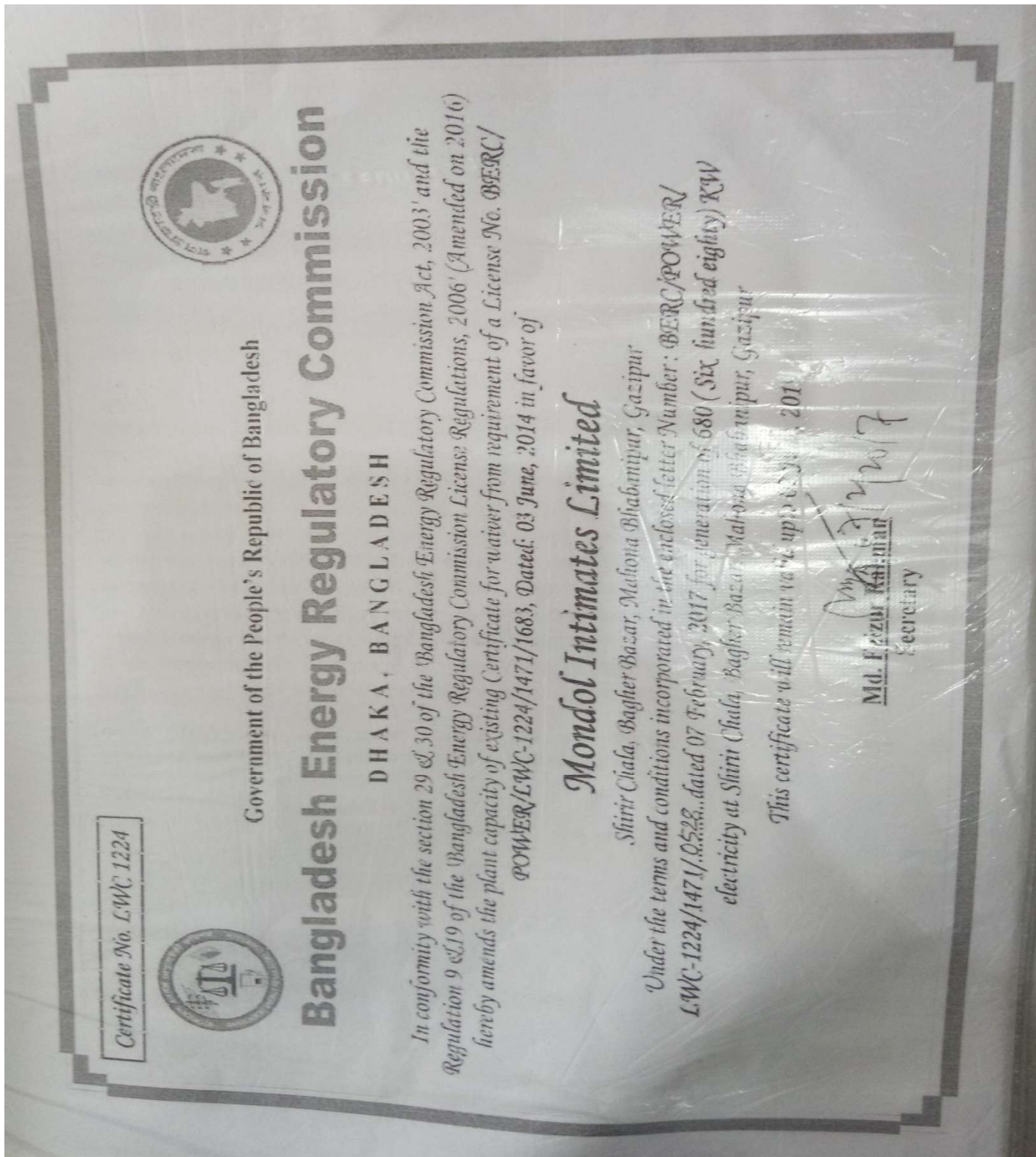
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