

FLUE GAS EMISSION MONITORING REPORT

Client: Tarsheed Energy Saving Solutions Co. LLC
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Al Majaz, Sharjah, United Arab Emirates

Site: Al Barsha, Dubai, United Arab Emirates

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Date: 05th July 2022

AHSL Report No: D22-428905

Accredited Laboratory: Al Hoty-Stanger Laboratory LLC.
(EIAC Accreditation Code: LB-TEST-001)
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Conducted By: MA

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Head of Environmental Department

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1.0 Introduction

Further to the request from Tarsheed Energy Saving Solutions Co. LLC, Al Hoty Stanger Laboratories (AHSL), Al Quoz Industrial Area 3, P.O Box 16756 – Dubai representatives visited Tarsheed Energy Saving Solutions Co. LLC, Al Barsha – Dubai on 22nd June and 01st July 2022 and conducted flue gas emission monitoring based on the standard testing procedures as reflected in our proposal.

2.0 Flue Gas Emission Monitoring

2.1 Objective

The objective of the tests was to estimate the pollutant concentration in the emissions before and after installation of emission content. This enabled AHSL to ascertain whether the gas components detected meets the limits prescribed by the local regulatory authority. Furthermore, a comparison of emission before and after installation of Tarsheed Energy Saver (TES) were also performed.

2.2 Monitoring Location

The following generator was monitored for its emission.

Table 2.2 Monitoring Location

Item No.	Generator Details	GPS Coordinates	Schedule
F1	Sl.No : CAT00C33CEC303277 Make : Caterpillar Capacity : 30 kVA Fuel : Diesel	[REDACTED]	Before Installation of Tarsheed Energy Saver (TES) 22/06/2022, 1105hrs –1150hrs
			After Installation of Tarsheed Energy Saver (TES) 01/07/2022, 1100hrs –1145hrs

2.3 Monitoring Plan

Table 2.3.1 Test Method

Item No.	Generator Sl. No.	Test Methods	Equipment
F1	CAT00C33CEC303277	AHSL SOP SET 001 in combination with US EPA CTM 034	Name : Flue Gas Analyzer Lab ID : DO/224 Calibration Due Date : 17/11/2022

Gaseous pollutants were monitored for 3 runs as per the standard requirements average of test phase data of each run are reported.

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2.4 Results

Table 2.4.1 Monitoring Results – Before Installation of Tarsheed Energy Saver (TES)

Parameters	Results			Measurement Uncertainty	UAE Limits ^{Ref 1}
	Run 1	Run 2	Run 3		
Oxygen (O ₂), %	13.77	13.68	13.64	±0.63	-
Carbon dioxide (CO ₂), %	4.93	4.95	4.92	±0.35	-
Carbon monoxide (CO), mg/Nm ³	143	143	143	±5.71	500
Nitrogen oxide (NO _x), mg/Nm ³	481	493	484	±13.67	500
Sulphur dioxide (SO ₂), mg/Nm ³	< 11.18	< 11.18	< 11.18	±9.37	500
Temperature, °C	290.4	293.7	288.8	±2.60	-

Ref 1: Cabinet Decree (12) of 2006 The regulation concerning Protection of air from pollution. Annex (2) Maximum Allowable Emission Limits of Air Pollutants Emitted from Hydrocarbon Fuel Combustion Sources–Diesel.

The reported measurement uncertainty (MU) is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

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Table 2.4.2 Monitoring Results – After Installation of Tarsheed Energy Saver (TES)

Parameters	Results			Measurement Uncertainty	UAE Limits ^{Ref 1}
	Run 1	Run 2	Run 3		
Oxygen (O ₂), %	17.21	19.70	19.11	±0.63	-
Carbon dioxide (CO ₂), %	1.00	0.96	1.02	±0.35	-
Carbon monoxide (CO), mg/Nm ³	45	47	47	±5.71	500
Nitrogen oxide (NO _x), mg/Nm ³	71	76	72	±13.67	500
Sulphur dioxide (SO ₂), mg/Nm ³	< 11.18	< 11.18	< 11.18	±9.37	500
Temperature, °C	220.4	267.9	288.0	±2.60	-

Ref 1: Cabinet Decree (12) of 2006 The regulation concerning Protection of air from pollution. Annex (2) Maximum Allowable Emission Limits of Air Pollutants Emitted from Hydrocarbon Fuel Combustion Sources–Diesel.

The reported measurement uncertainty (MU) is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

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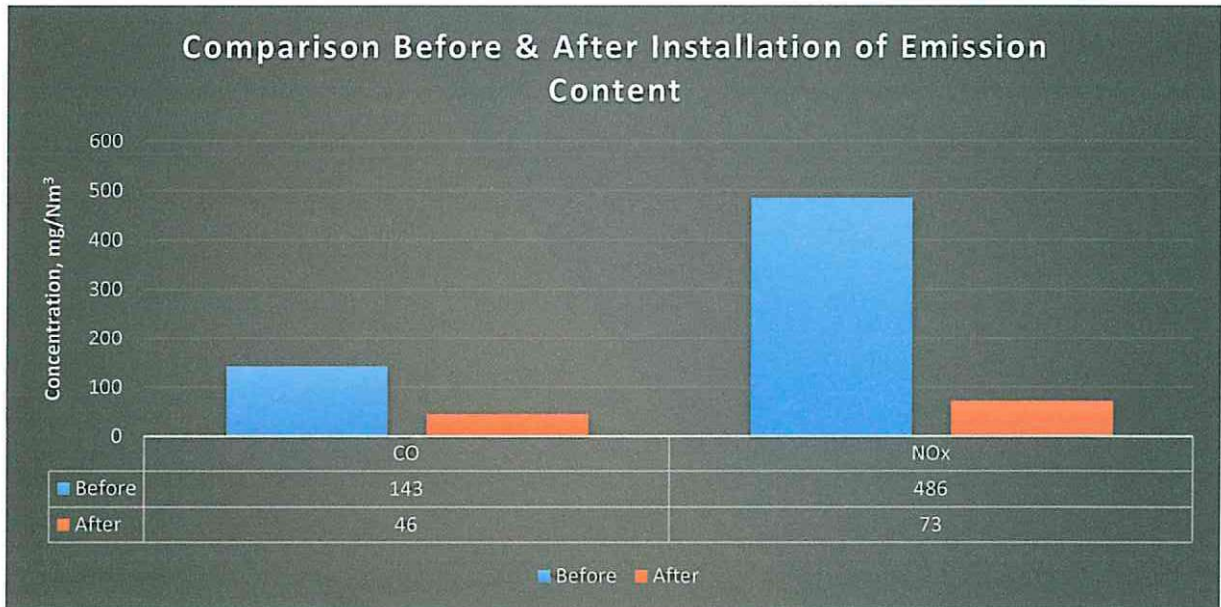
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**Table 2.4.3 Average Monitoring Results & Percentage Reduction of Major Pollutants—
Before & After Installation of Tarsheed Energy Saver (TES)***

Parameters	Results		
	Before Installation	After Installation	Percentage Reduction
Carbon monoxide (CO), mg/Nm ³	143	46	68%
Nitrogen oxide (NO _x), mg/Nm ³	486	73	85%
Sulphur dioxide (SO ₂), mg/Nm ³	< 11.18	< 11.18	NIL

* Comparison is made as per client request

2.5 Comparison Chart



2.6 Conclusion

➤ **Before Installation of Tarsheed Energy Saver (TES):**

- Concentration of Carbon monoxide (CO) and Sulphur dioxide (SO₂) measured in all 3 runs meets the prescribed limits at the time of monitoring.
- Concentration of Nitrogen oxide (NO_x) measured in run 1 & run 3 meets the prescribed limits at the time of monitoring.

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- Concentration of Nitrogen oxide (NO_x) measured in run 2 were below the prescribed limit by a margin less than measurement uncertainty, it is therefore it is not possible to state the compliance based on the stated level of confidence (95%). However, the result indicate compliance is more probable than non-compliance.

➤ **After Installation of Tarsheed Energy Saver (TES):**

- Concentration of Carbon monoxide (CO), Nitrogen oxide (NO_x) and Sulphur dioxide (SO₂) measured in all 3 runs meets the prescribed limits at the time of monitoring.

➤ **Comparison of Before and After Installation of Tarsheed Energy Saver (TES):**

- Concentration of Carbon monoxide (CO) showed a reduction of 68% after installation of Tarsheed Energy Saver (TES).
- Concentration of Nitrogen oxide (NO_x) showed a reduction of 85% after installation of Tarsheed Energy Saver (TES).
- Concentration of Sulphur dioxide (SO₂) was not detected before and after installation of Tarsheed Energy Saver (TES). Hence a comparison cannot be performed.

Conclusion of each test is as per QSP 21

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Sudeep K B
Head of Environmental Department
for Al Hoty Stanger Laboratories

----- End of the Report -----