



编号: WT-05-166-01-FC10

TEST REPORT

Project Name: Diesel Engine Performance Test with “TADGER Exhaust Emission Reduction Device”

Customer Name: Shanghai Suntek Environmental Technologies Co., Ltd.

Test Classification: Customer Requested

Date Issued: August 16, 2005



Energy Utilization Monitoring Centre of Vehicle Transportation Industry

The Ministry of Communications

Terms and Conditions

1. This test report relates only to the provided samples;
2. This test report is invalid without the authorized stamp;
3. This test report is invalid without the signatures of the inspector and auditor;
4. This test report is invalid if the changes made without approval;
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6. The appeal of the test results is only acceptable within three months commenced on the date of the report received;
7. The appeal of the test results will not be accepted under the following conditions: samples are difficult to preserve (high volatilization, moisture absorption etc.); no samples are retained in the test centre after tests; tests are non-repeatable.

Test Centre:

Address: 8 Xitucheng Road, Haidian District, Beijing

Phone: 010-62079180 Fax: 010-62079180

Post Code: 100088

Customer:

Address: Room 6109, No. 29 Jianguo Zhong Road, Shanghai

Phone / Fax: 021-64720769 / 021-64729540

Post Code: 200025

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Summary

Sample Name	TADGER Exhaust Emission Reduction Device	Type/Spec. Trade Mark	Diesel Tadger / MLDT-001 TADGER
Sample Quantity	1 Set	Serial No. or Manufactured Date	----
Customer Name	Shanghai Suntek Environmental Technologies Co., Ltd.	Test Classification	Customer Requested
Manufacturer	TADGER Group International	Product Level	Q.C. Passed
Sender	Xu, JianYe	Date Submitted	July. 21, 2005
Test Standard	1. GB/T 14951-1994 Evaluation Method for Vehicle Fuel-Saving Technique. 2. JT/T 306-1997 Automotive Fuel Saving Product Application Conditions	Test Items	1. Evaluation of diesel engine load profile; 2. Evaluation of diesel engine total power; 3. Evaluation of diesel engine smoke density at full engine speed;
Test Results or Conclusion	<p>The test bench performances of a 6110A-1 diesel engine are analyzed according to the test specifications described in GB/T 14951-1994 (Evaluation Method for Vehicle Fuel Saving Technique). The comparisons of the data recorded with and without the TADGER Exhaust Emission Reduction Device installed show that:</p> <p>1. Load profile tests Reductions of fuel consumptions under urban driving condition: 1.3% Reductions of fuel consumptions under intra-city driving condition: 1.4% Reductions of fuel consumptions under high-way driving condition: 2.2%</p> <p>2. Total engine power Torque ratio: 1.0 Power ratio: 1.0</p> <p>3. Five engine speed averaged smoke density reduction rate: 10.8%</p> <p>4. The reduction of fuel consumption, torque ratio, power ratio, and reduction of smoke density after installing "TADGER Exhaust Emission Reduction Device" are compiled with the regulations of JT/T 306-1997 - Automotive Fuel Saving Product Application Conditions.</p>		
Remark	<p>1. The test sample was picked by Energy Utilization Monitoring Centre of Vehicle Transportation Industry.</p> <p>2. According to the arrow which indicates the flow direction on the device is connected to the rear end of fuel filter through the connector and the other end is connected to the input of high pressure fuel pump. After the installation of the sample product, the test was conducted when the diesel engine has run two hours.</p>		



Authorizer:  Auditor:  Test Engineer: 

1. Objective

The objective of the project submitted by Shanghai Suntek Environmental Technologies Co., Ltd is to evaluate the diesel engine test bench performance after installing the “TADGER Exhaust Emission Reduction Device”, which is manufactured by TADGER Group International. The tests were conducted by Energy Utilization Monitoring Centre of Vehicle Transportation Industry.

The effects of “TADGER Exhaust Emission Reduction Device” on the fuel economy, dynamics, and smoke density of a 6110A-1 engine are evaluated by comparing the engine test bench performance with and without the TADGER installed.

2. Test Specification

2.1 GB/T 14951-1994 Evaluation Method for Vehicle Fuel-Saving Technique

2.2 JT/T 306-1997 Automotive Fuel Saving Product Application Conditions

3. Test Sample

3.1 Sample Name: TADGER Exhaust Emission Reduction Device

3.2 Sample Collected by:

3.3 Manufacturer: TADGER Group International, Canada

3.4 Sample Quantity: 1 (set)

3.5 Sample Status: Q.C. Passed

3.6 Sample Condition: Normal

3.7 Sample Description and Installation: The submitted sample is a cylindrical metal device with connectors on both ends. According to the arrow which indicates the flow direction on the device, one end of the device is connected to the rear end of fuel filter through the connector and the other end is connected to the input of high pressure fuel pump. After the installation of the sample product, the test was conducted when the diesel engine has run two hours.

4. Test Items

4.1 Different engine load profile test

4.2 Engine total power test

4.3 Smoke emission test at full engine speed

5. Test Date, Location, and Facility and Equipment

5.1 Test Conditions

Item	Date	Atmospheric Pressure, kPa	Dry Temperature, °C	Wet Temperature, °C
Engine without sample installed	Aug. 1, 2005	99.7	32.0	27.5
Engine with sample installed	Aug. 3, 2005	100.0	27.5	24.0

5.2 Test Location

The Engine Test Lab of Energy Utilization Monitoring Centre of Vehicle Transportation Industry, the Ministry of Communications

5.3 Facility and Equipment

5.3.1 Testing Engine: 6110A-1 Diesel Engine

5.3.2 CW260 Eddy Current Power Metering Instrument

5.3.3 FCM-D Fuel Consumption and Speed Measuring Instrument

5.3.4 DSM-20A Smoke Analyzer

5.3.5 Lubrication Oil: 15W/40CD

5.3.6 Fuel: #0 diesel, fuel density is 0.838g/cm³.

6. Test Results

6.1 The comparisons of engine load characteristics are shown in Table 1 to 5, 7 to 11, and Figure 1 to 6;

6.2 The comparisons of total engine power are shown in Table 6, 12, and Figure 7;

6.3 The comparison of smoke density at full throttle is shown in Table 15;

6.4 6110A-1 diesel engine test bench performance are analyzed according to the test specifications described in GB/T 14951-1994 (Evaluation Method for Vehicle Fuel Saving Technique):

6.4.1 As shown in Tables 13 and 14, when the testing engine was running at constant speed of 30, 40, 50, 60, and 70 km/hr, the reduction rates of fuel consumptions were 1.3%, 1.3%, 1.4%, 1.3%, and 2.2%, respectively.

The reduction rate of fuel consumptions under urban driving condition is 1.3%,

The reduction rate of fuel consumptions under intra-city driving condition is 1.4%,

The reduction rate of fuel consumptions under highway driving condition is 2.2%.

6.4.2 It is calculated from Tables 6 and 12 that the engine torque ratio is 1.0 and power ratio is 1.0.

6.4.3 It is shown in Table 15 that the average smoke density reduction rate is 10.8% for five engine speed, namely 1400, 1800, 2200, 2600, and 2900 r/min.

6.5 The reduction of fuel consumption, torque ratio, power ratio, and reduction of smoke density after installing "TADGER Exhaust Emission Reduction Device" are compiled with the regulations of JT/T 306-1997 - Automotive Fuel Saving Product Application Conditions.

7. Appendix

Table 1 “Engine without TADGER installed” V = 30 km/hr Test Data
Engine Model: 6110A-1 Test Date: Aug. 1, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	980	60	6.2	7.41
2	980	100	10.3	9.89
3	980	140	14.4	12.46
4	980	176	18.1	14.92
5	981	220	22.6	17.71
6	981	261	26.8	20.51
7	982	291	30.0	22.92

Table 2 “Engine without TADGER installed” V = 40 km/hr Test Data
Engine Model: 6110A-1 Test Date: Aug. 1, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	1299	80	10.9	8.35
2	1303	120	16.4	10.82
3	1301	160	21.8	13.32
4	1300	200	27.2	15.92
5	1295	240	32.6	18.66
6	1300	180	38.1	21.51
7	1299	320	43.5	24.71
8	1299	338	46.0	26.26

Table 3 “Engine without TADGER installed” V = 50 km/hr Test Data
Engine Model: 6110A-1 Test Date: Aug. 1, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	1631	90	15.3	9.27
2	1631	120	20.5	11.10
3	1631	160	28.3	13.54
4	1630	200	34.1	16.09
5	1630	240	40.9	18.78
6	1629	280	47.7	21.48
7	1629	310	52.9	23.79
8	1629	367	62.5	28.77

Table 4 “Engine without TADGER installed” V = 60 km/hr Test Data

Engine Model: 6110A-1

Test Date: Aug. 1, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	1950	110	22.5	10.79
2	1951	140	28.7	12.61
3	1951	170	34.7	14.55
4	1950	210	42.9	17.09
5	1951	250	51.1	19.74
6	1950	280	57.2	21.79
7	1951	310	63.3	24.00
8	1950	377	77.0	29.95

Table 5 “Engine without TADGER installed” V = 70 km/hr Test Data

Engine Model: 6110A-1

Test Date: Aug. 1, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	2281	120	28.7	12.01
2	2281	150	35.8	13.90
3	2281	180	43.0	15.81
4	2280	210	50.1	17.76
5	2279	240	57.3	19.81
6	2282	270	64.4	21.86
7	2281	300	71.6	24.15
8	2282	360	86.1	28.16

Table 6 “Engine without TADGER installed” Test Data

Engine Model: 6110A-1

Test Date: Aug. 1, 2005

No.	Speed	Calibrated Torque	Calibrated Power	Calibrated Fuel Consumption rate	Fuel Consumption
	r/min	N.m	kW	g/kW·hr	kg/hr
1	1002	301	31.5	232	7.3
2	1200	330	41.4	232	9.6
3	1400	359	52.7	232	12.2
4	1601	370	62.1	233	14.5
5	1899	383	72.1	233	16.8
6	2001	381	79.8	235	18.8
7	2201	369	85.1	237	20.2
8	2399	363	91.2	243	22.2
9	2602	351	95.7	254	24.3
10	2802	336	98.7	266	26.2
11	2899	328	99.7	269	26.9

Table 7 “Engine with TADGER installed” V = 30 km/hr Test Data

Engine Model: 6110A-1

Test Date: Aug. 3, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	980	60	6.2	7.30
2	980	100	10.3	9.77
3	980	140	14.4	12.35
4	980	175	18.0	14.71
5	979	220	22.6	17.35
6	981	260	26.7	20.32
7	980	300	30.8	23.46

Table 8 “Engine with TADGER installed” V = 40 km/hr Test Data

Engine Model: 6110A-1

Test Date: Aug. 3, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	1299	80	10.9	8.21
2	1299	120	16.3	10.65
3	1299	160	21.8	13.10
4	1300	200	27.2	15.76
5	1299	240	32.6	18.34
6	1299	280	38.1	21.10
7	1300	320	43.6	24.31
8	1299	348	47.3	26.63

Table 9 “Engine with TADGER installed” V = 50 km/hr Test Data

Engine Model: 6110A-1

Test Date: Aug. 3, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	1631	90	15.4	9.07
2	1631	120	20.5	10.95
3	1629	160	27.3	13.33
4	1629	200	34.1	15.87
5	1631	240	41.0	18.48
6	1631	280	47.8	21.22
7	1631	310	52.9	23.44
8	1629	377	64.3	29.13

Table 10 “Engine with TADGER installed” V = 60 km/hr Test Data

Engine Model: 6110A-1

Test Date: Aug. 3, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	1950	110	22.5	10.64
2	1950	140	28.6	12.46
3	1950	170	34.7	14.35
4	1949	210	42.8	16.88
5	1951	250	51.1	19.44
6	1950	280	57.1	21.50
7	1950	310	63.3	23.59
8	1950	384	78.4	30.02

Table 11 “Engine with TADGER installed” V = 70 km/hr Test Data

Engine Model: 6110A-1

Test Date: Aug. 3, 2005

No.	Speed	Torque	Power	Fuel Consumption
	r/min	N.m	kW	kg/100 km
1	2282	120	28.7	11.75
2	2282	150	35.8	13.63
3	2282	180	43.0	15.46
4	2279	210	50.1	17.34
5	2280	240	57.3	19.36
6	2281	270	64.5	21.49
7	2280	299	71.4	23.53
8	2280	368	87.9	29.18

Table 6 “Engine with TADGER installed” Test Data

Engine Model: 6110A-1

Test Date: Aug. 3, 2005

No.	Speed	Calibrated Torque	Calibrated Power	Calibrated Fuel Consumption rate	Fuel Consumption
	r/min	N.m	kW	g/kW·hr	kg/hr
1	999	310	32.4	230	7.5
2	1202	340	42.8	230	9.9
3	1401	366	53.7	230	12.3
4	1602	381	63.9	230	14.7
5	1799	389	73.4	231	16.9
6	1999	389	81.5	234	19.1
7	2199	377	86.9	236	20.5
8	2402	369	92.7	241	22.3
9	2602	357	97.2	252	24.5
10	2800	343	100.6	263	26.5
11	2899	335	101.6	268	27.2

Table 13 Overall Constant Speed Test Data (Reduction in Fuel Consumption: kg/100km)

Speed km/h	30	40	50	60	70
Engine without TADGER installed [1]	12.59	13.00	14.41	15.90	17.94
Engine with TADGER installed [2]	12.43	12.83	14.21	15.69	17.55
[2] over [1] Reduction of Fuel	0.16	0.17	0.20	0.21	0.39
[2] over [1] Rate of Reduction	1.3%	1.3%	1.4%	1.3%	2.2%

Table 14 Overall Evaluation Results (Reduction in Fuel Consumption: kg/100km)

Item	Urban Driving Condition	Intra-City Driving Condition	High Way Driving Condition
[2] over [1] Reduction of Fuel	0.17	0.20	0.39
[2] over [1] Rate of Reduction	1.3%	1.4%	2.2%

Note: [1]-Engine without TADGER installed [2]-Engine with TADGER installed

Fuel Consumption
kg/100km

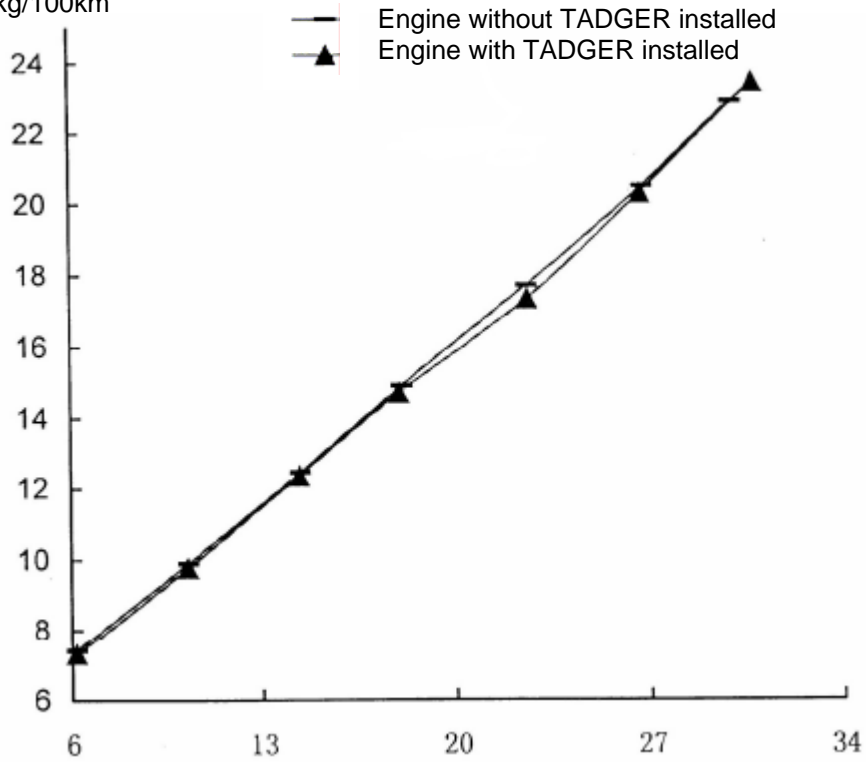


Figure 1. V = 30 km/h Fuel consumption Power kW

Fuel Consumption
kg/100km

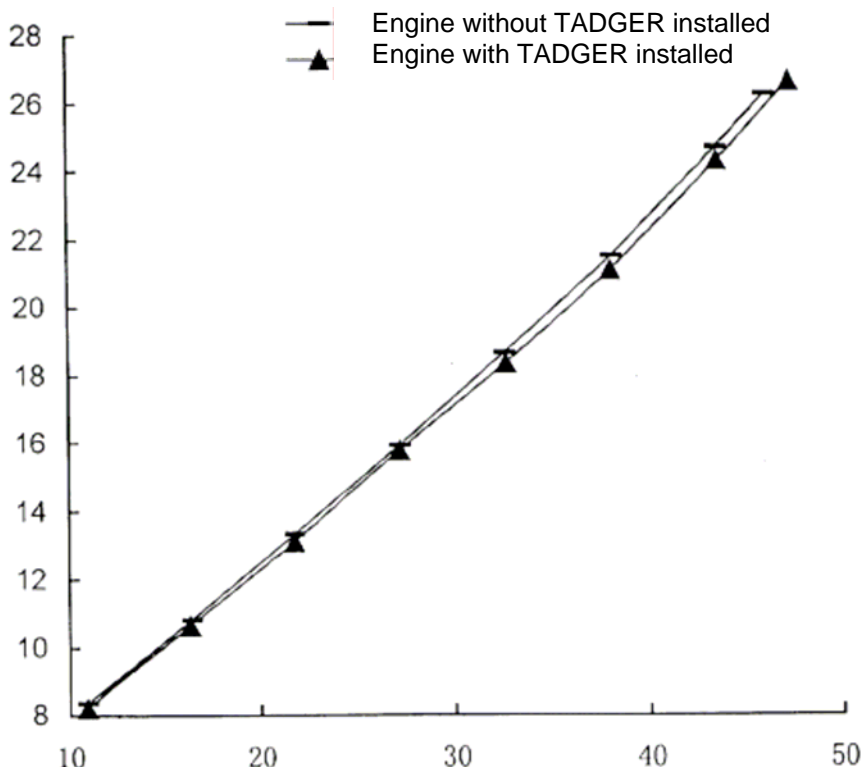


Figure 2. V = 40 km/h Fuel consumption Power kW

Fuel Consumption
kg/100km

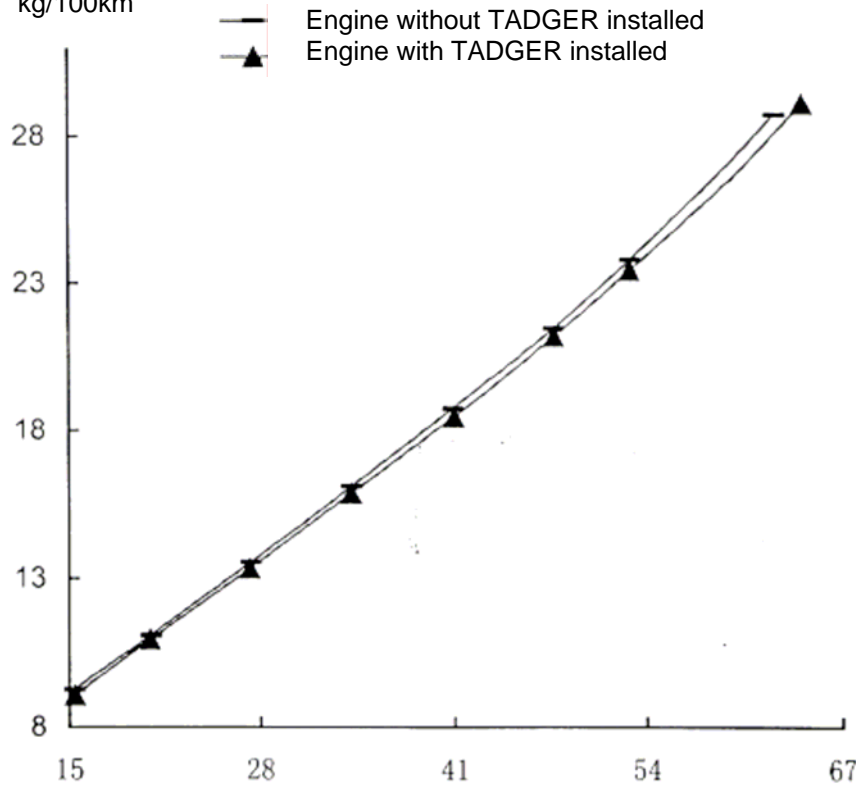


Figure 3. V = 50 km/h Fuel consumption Power kW

Fuel Consumption
kg/100km

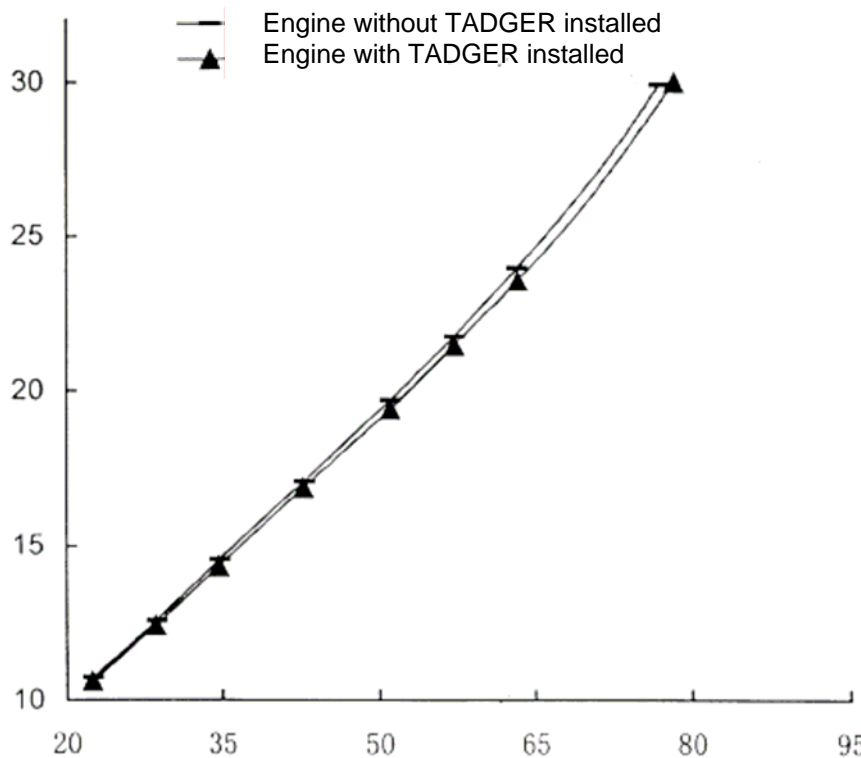


Figure 4. V = 60 km/h Fuel consumption Power kW

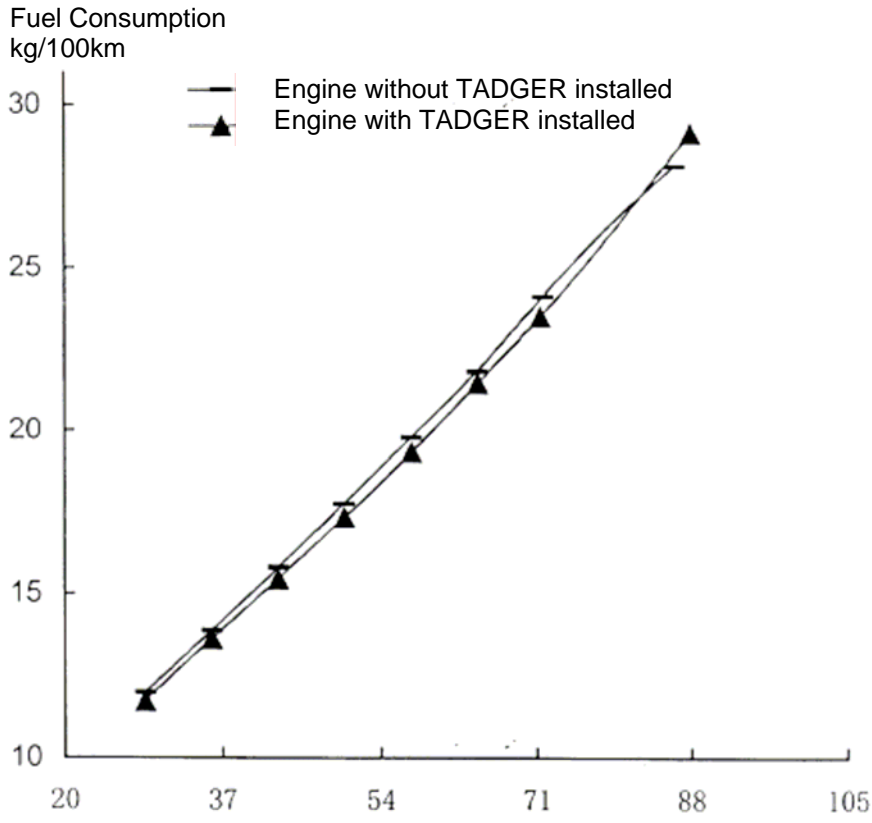


Figure 5. V = 70 km/h Fuel consumption Power kW

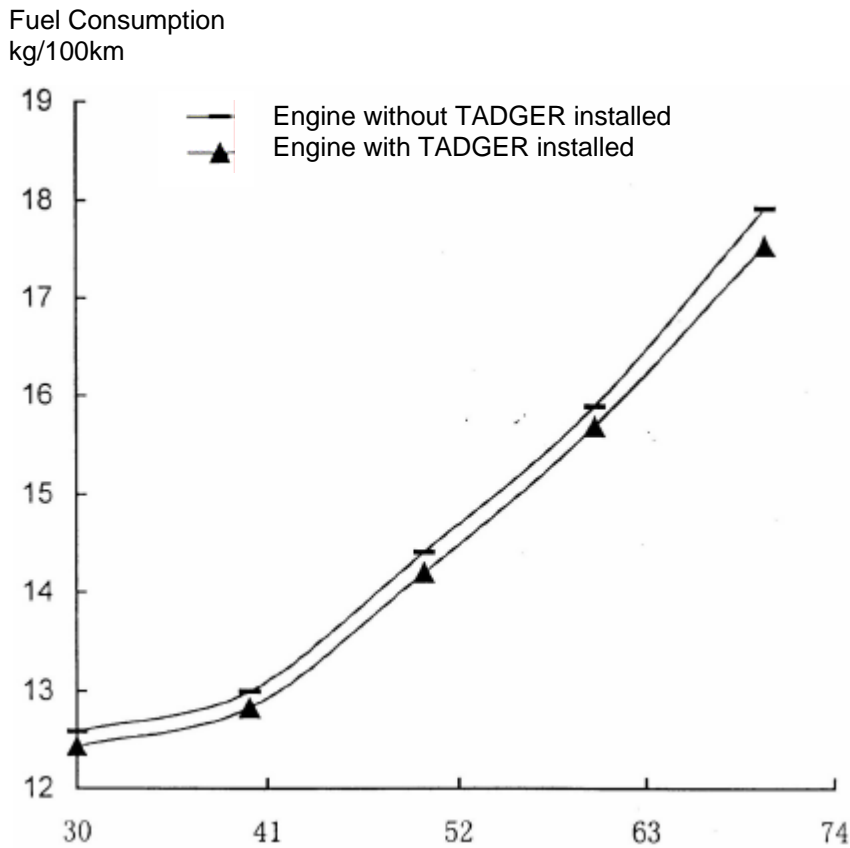


Figure 6. Overall Fuel consumption Power kW

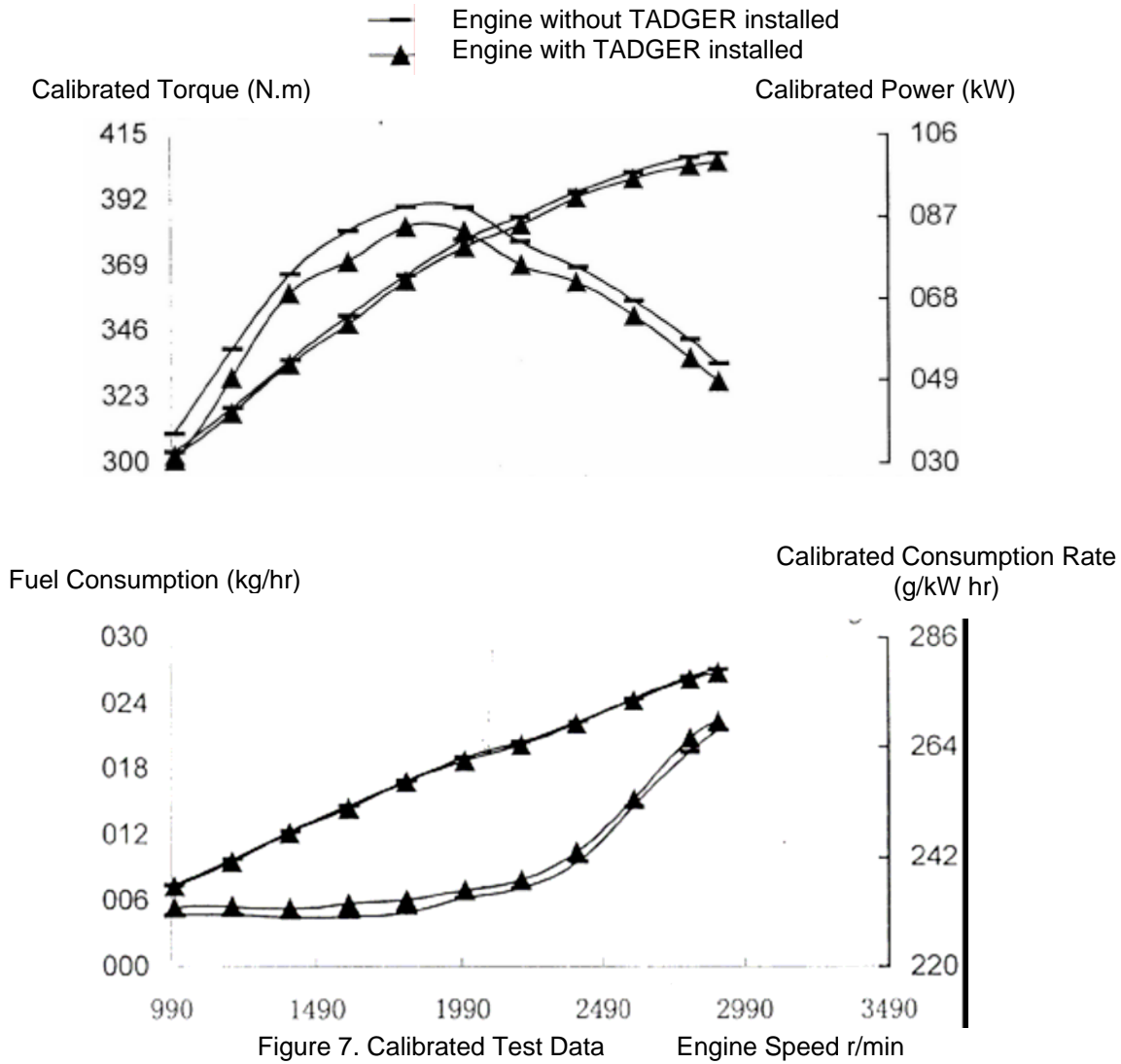


Figure 7. Calibrated Test Data