LAMPIRAN

LAMPIRAN 1

Data Hasil Pengujian Unjuk Kerja Mesin

DATA PENGOPERASIAN MESIN NO. 1 MENGGUNAKAN BAHAN BAKAR CPO & CAMPURAN

NO.	TANGGAL	JAM		LAMA OPERASI (hr)				KETERANGAN
		MULAI	SELESAI	500 W	1000 W	1500 W	2000 W	
1	3-12-2007	11.00	12.30	1.50				Operasi pemanasan dengan Solar
2	3-12-2007	12.30	18.30	6.00				Pengujian dengan CPO 100% dipanaskan
3	3-12-2007	18.30	20 00	0.50				Operasi pembersihan saluran dengan Solar
4	5-12-2007	10.30	11.00	0.50				Operasi pemanasan dengan Solar
5	5-12-2007	11.00	17.00		6.00			Pengujian dengan CPO 100% dipanaskan
6	5-12-2007	17.00	17.30	0.50				Operasi pembersihan saluran dengan Solar
7	7-12-2007	13.40	14.10	0.50				Operasi pemanasan dengan Solar
8	7-12-2007	14.10	19.10			5.00		Pengujian dengan CPO 100% dipanaskan
9	7-12-2007	19.10	19.40	0.50				Operasi pembersihan saluran dengan Solar
10	8-12-2007	11.30	12.30	1.00				Operasi pemanasan dengan Solar
11	8-12-2007	12.30	20.00				7.50	Pengujian dengan CPO 100% dipanaskan
12	8-12-2007	20.00	20.30	0.50				Operasi pembersihan saluran dengan Solar
13	15-03-2008	15.10	15.40	0.50				Operasi pemanasan dengan Solar
14	15-03-2008	15.40	16.40	1.00				Pengujian dengan Solar 100%
15	15-03-2008	16.40	18.00		1.33			Pengujian dengan Solar 100%
16	5-4-2008	13.15	13.30	0.25				Operasi pemanasan dengan Solar
17	5-4-2008	13.30	14.30	1.00				Pengujian dengan Solar 100%
18	5-4-2008	14.30	15.30		1.00			Pengujian dengan Solar 100%
19	5-4-2008	15.30	16.30			1.00		Pengujian dengan Solar 100%
20	5-4-2008	16.30	17.30				1.00	Pengujian dengan Solar 100%
21	5-4-2008	17.30	17.45	0 25				Pendinginan
22	6-4-2008	13.15	13.30	0.25				Operasi pemanasan dengan Solar
23	6-4-2008	13.30	14.30	1.00				Pengujian dengan CPO 25%
24	6-4-2008	14 30	15.30		1.00			Pengujian dengan CPO 25%
25	6-4-2008	15.30	16.30			1.00		Pengujian dengan CPO 25%
26	6-4-2008	16.30	17.30				1.00	Pengujian dengan CPO 25%
27	6-4-2008	17.30	17.45	0.25				Operasi pembersihan saluran dengan Solar
28	11-4-2008	9.05	9.20	0 25				Operasi pemanasan dengan Solar
29	11-4-2008	9.20	10.20	1.00				Pengujian dengan CPO 50%
30	11-4-2008	10.20	11.20		1.00			Pengujian dengan CPO 50%
31	11-4-2008	11.20	12.20			1.00		Pengujian dengan CPO 50%
32	11-4-2008	12.20	13.20				1.00	Pengujian dengan CPO 50%
33	11-4-2008	13 20	13.50	0 50				Pengujian dengan CPO 75% (Mesin Hunting)
34	11-4-2008	14 35	14.50	0.25				Operasi pemanasan dengan Solar
35	11-4-2008	14.50	15.50	1.00				Pengujian dengan CPO 10%
36	11-4-2008	15.50	16.50		1.00			Pengujian dengan CPO 10%
37	11-4-2008	16.50	17.50			1.00		Pengujian dengan CPO 10%
38	11-4-2008	17.50	18.50				1.00	Pengujian dengan CPO 10%
39	11-4-2008	18.50	19.05	0 25				Operasi pembersihan saluran dengan Solar
40	11-4-2008	8.30	9.15					Ganti Oli Mesin Top One
41	12-4-2008	9.20	10.00	0.67				Operasi pemanasan dengan Solar
42	12-4-2008	10.00	11.00	1 00				Pengujian dengan CPO 20%
43	12-4-2008	11.00	12.00		1.00			Pengujian dengan CPO 20%
44	12-4-2008	12 00	13.00			1 00		Pengujian dengan CPO 20%
45	12-4-2008	13 00	14 00				1.00	Pengujian dengan CPO 20%
46	12-4-2008	14 00	15 00	1 00				Pengujian dengan CPO 30%

47	12-4-2008	15.00	16.00		1.00			Pengujian dengan CPO 30%
48	12-4-2008	16.00	17.00			1.00		Pengujian dengan CPO 30%
49	12-4-2008	17.00	18.00				1.00	Pengujian dengan CPO 30%
50	12-4-2008	18.00	19.00	1.00				Pengujian dengan CPO 40%
51	12-4-2008	19.00	20.00		1.00			Pengujian dengan CPO 40%
52	12-4-2008	20.00	21.00			1.00		Pengujian dengan CPO 40%
53	12-4-2008	21.00	22.00				1.00	Pengujian dengan CPO 40%
54	12-4-2008	22.00	22.15	0.25				Operasi pembersihan saluran dengan Solar
55	13-4-2008	12.30	14.00	1.50				Operasi pemanasan dengan Solar
56	13-4-2008	14.00	18.00	4.00				Pengujian dengan CPO 75% dipanaskan
57	13-4-2008	18.00	18.15	0.25				Operasi pembersihan saluran dengan Solar
58	16-4-2008	14.10	14.40	0.50				Operasi pemanasan dengan Solar
59	16-4-2008	14.40	18.40		4.00			Pengujian dengan CPO 75% dipanaskan
60	16-4-2008	18.40	19.10	0.50				Operasi pembersihan saluran dengan Solar
61	18-4-2008	10.00	10.30	0.50				Operasi pemanasan dengan Solar
62	18-4-2008	10.30	13.00			2.00		Pengujian dengan CPO 75% dipanaskan
63	18-4-2008	13.00	15.00				2.00	Pengujian dengan CPO 75% dipanaskan
64	18-4-2008	15.00	17.00	2.00				Pengujian dengan CPO 50% dipanaskan
65	18-4-2008	17.00	19.30		2.50			Pengujian dengan CPO 50% dipanaskan
66	18-4-2008	19.30	20.00	0.50				Operasi pembersihan saluran dengan Solar
67	19-4-2008	10.00	10.30	0.50				Operasi pemanasan dengan Solar
68	19-4-2008	10.30	12.30			2.00		Pengujian dengan CPO 50% dipanaskan
69	19-4-2008	12.30	15.00				2.50	Pengujian dengan CPO 50% dipanaskan
70	19-4-2008	15.00	17.30	2.50				Pengujian dengan CPO 25% dipanaskan
71	19-4-2008	17.30	20.00		2.50			Pengujian dengan CPO 25% dipanaskan
72	19-4-2008	20.00	20.15	0.25				Operasi pembersihan saluran dengan Solar
73	20-4-2008	9.30	10.00	0.50				Operasi pemanasan dengan Solar
74	20-4-2008	10.00	12.00			2.00		Pengujian dengan CPO 25% dipanaskan
75	20-4-2008	12.00	14.00				2.00	Pengujian dengan CPO 25% dipanaskan
76	20-4-2008	14.00	16.30	2.50				Pengujian dengan CPO 100% dipanaskan
77	20-4-2008	16.30	19.00		2.50			Pengujian dengan CPO 100% dipanaskan
78	20-4-2008	19.00	19.30	0.50				Operasi pembersihan saluran dengan Solar
79	23-4-2008	13.00	15.00	2.00				Operasi pemanasan dengan Solar
80	23-4-2008	15.00	17.00			2.00		Pengujian dengan CPO 100% dipanaskan
81	23-4-2008	17.00	19.30				2.50	Pengujian dengan CPO 100% dipanaskan
82	23-4-2008	19.30	19.45	0.25				Operasi pembersihan saluran dengan Solar
83	31-05-2008	14.00	15.00	1.00				Pengujian dengan Solar 100%
84	31-05-2008	15.00	16.00		1.00			Pengujian dengan Solar 100%
85	31-05-2008	16.00	17.00			1.00		Pengujian dengan Solar 100%
86	31-05-2008	17.00	18.00				1.00	Pengujian dengan Solar 100%
TOTAL JAM OPERASI				42.92	26.83	21.00	24.50	
				115.25				

DATA PENGOPERASIAN MESIN NO. 2 MENGGUNAKAN BAHAN BAKAR SOLAR

NO.	TANGGAL	JAM		LAMA OPERASI (hr)				KETERANGAN
		MULAI	SELESAI	500 W	1000 W	1500 W	2000 W	
1	9-12-2007	10.30	12.00	1.5				Operasi pemanasan dengan Solar
2	9-12-2007	12.00	13.00	1.0				Pengujian dengan Solar 100%
3	9-12-2007	14.30	16.00		1.5			Pengujian dengan Solar 100%
4	9-12-2007	16.00	17.00			1.0		Pengujian dengan Solar 100%
5	9-12-2007	17.00	18.00				1.0	Pengujian dengan Solar 100%
6	9-12-2007	18.00	18.30	0.5				Pendinginan
7	25-04-2008	13.45	14.00	0.25				Operasi pemanasan dengan Solar
8	25-04-2008	14.00	15.00	1.0				Pengujian dengan Solar 100%
9	25-04-2008	15.00	16.00		1.0			Pengujian dengan Solar 100%
10	25-04-2008	16.00	17.00			1.0		Pengujian dengan Solar 100%
11	25-04-2008	17.00	18.30				1.5	Pengujian dengan Solar 100%
12	26-04-2008	10.00	14.20	4.33				Running Test
13	26-04-2008	14.20	18.20		4.00			Running Test
14	27-04-2008	10.00	18.00				8.00	Running Test
15	28-04-2008	11.00	18.00	7.00				Running Test
16	29-04-2008	10.00	17.00		7.00			Running Test
17	30-04-2008	12.00	17.00					Running Test
18	06-05-2008	8.00	18.00	10.00				Running Test
19						2.00		Running Test
20	13-05-2008	10.00	16.00			6.00		Running Test
21	16-05-2008	9.30	18.30			9.00		Running Test
22	17-05-2008	10.00	18.00	8.00				Running Test
23	18-05-2008	10.00	17.00	7.00				Running Test
24	19-05-2008	12.00	18.00		6.00			Running Test
25	20-05-2008	10.00	16.00		6.00			Running Test
26	21-05-2008	13.00	18.00				5.00	Running Test
27	23-05-2008	12.00	14.00				2.00	Running Test
28	23-05-2008	11.30	17.00				5.50	Running Test
29	23-05-2008	13.30	15.00	1.50				Pengujian dengan Solar 100%
30	23-05-2008	15.00	16.00		1.00			Pengujian dengan Solar 100%
31	23-05-2008	16.00	17.00			1.00		Pengujian dengan Solar 100%
32	23-05-2008	17.00	18.00				1.00	Pengujian dengan Solar 100%
TOTAL JAM OPERASI				42.08	26.50	20.00	24.00	
				112.58				

Laboratorium Thermodinamika
Departemen Teknik, Universitas Indonesia
Kampus Baru UI, Depok 16424

Test on : 5 April 2008
Tested Fuel : SOLAR
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 8,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2. Displacement (V) : 0,353 L
3. Engine Cylinder Bore (D) : 7.5 cm
4 Engine Piston Stroke (S) : 8,0 cm
5 No. of Cylinder (n) : 1
6 Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 0 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement											Result					
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	W	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	51	6.40.46	220.3	1.7	31	25	80	28	NA	NA	NA	3.5	130	0.8357	43,124	447.30	0.8193	10.19
2	500	1500	51	6.42.52	220.1	1.7	31	25	80	28	NA	NA	NA	3.7	131	0.8357	43,124	445.07	0.8193	10.19
Average														3.60	130.5	0.8357	43,124	446.19	0.8193	10.19
1	1000	1500	85	5.20.69	221.7	3.5	31	25	81	28	NA	NA	NA	4.1	164	0.8357	43,124	954.19	0.4916	16.98
2	1000	1500	85	5.22.94	220.7	3.6	31	25	83	28	NA	NA	NA	4.1	165	0.8357	43,124	947.54	0.4916	16.98
Average														4.10	164.5	0.8357	43,124	950.87	0.4916	16.98
1	1500	1500	102	4.12.82	220.2	5.7	32	25	86	28	NA	NA	NA	13.3	197	0.8357	43,124	1452.42	0.4096	20.38
2	1500	1500	102	4.14.93	218.5	5.7	31	25	85	28	NA	NA	NA	14.1	198	0.8357	43,124	1440.40	0.4096	20.38
Average														13.70	197.5	0.8357	43,124	1446.41	0.4096	20.38
1	2000	1500	108	3.14.66	221.7	7.8	31	25	90	28	NA	NA	NA	39.0	265	0.8357	43,124	1997.12	0.3869	21.58
2	2000	1500	107	3.14.65	220.7	7.8	32	25	89	28	NA	NA	NA	39.0	266	0.8357	43,124	1978.94	0.3905	21.38
Average														39.00	266.5	0.8357	43,124	1988.03	0.3887	21.48

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Test on : 31 Mei 2008
Tested Fuel : Solar 100%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2. Displacement (V) : 0,353 L
3. Engine Cylinder Bore (D) : 7.5 cm
4 Engine Piston Stroke (S) : 8.0 cm
5 No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 0 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_{fs}	T_0	T_1	T_2	Opacity	Tg	γ	LHV	W	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	52	6.44.19	220.3	1.4	32	28	64	28	NA	NA	NA	4.7	133	0.8340	43,124	463.15	0.8019	10.41
2	500	1500	52	6.44.21	220.4	1.4	32	28	64	28	NA	NA	NA	3.8	135	0.8340	43,124	463.13	0.8019	10.41
Average														4.25	134.0	0.8340	43,124	463.14	0.8019	10.41
1	1000	1500	85	5.25.22	220.7	3.4	33	28	70	28	NA	NA	NA	7.3	160	0.8340	43,124	940.90	0.4906	17.02
2	1000	1500	85	5.26.01	220.8	3.4	33	28	69	28	NA	NA	NA	5.0	169	0.8340	43,124	938.62	0.4906	17.02
Average														6.15	164.5	0.8340	43,124	939.76	0.4906	17.02
1	1500	1500	103	4.15.09	220.1	5.9	33	28	74	28	NA	NA	NA	9.2	202	0.8340	43,124	1,453.60	0.4049	20.62
2	1500	1500	103	4.15.10	220.2	5.9	33	28	76	28	NA	NA	NA	9.2	204	0.8340	43,124	1,453.55	0.4049	20.62
Average														9.20	203.0	0.8340	43,124	1,453.58	0.4049	20.62
1	2000	1500	110	3.17.81	220.7	8.1	34	28	76	28	NA	NA	NA	29.0	271	0.8340	43,124	2,001.92	0.3791	22.02
2	2000	1500	110	3.18.91	220.6	8.1	34	28	79	28	NA	NA	NA	25.0	266	0.8340	43,124	2,011.07	0.3791	22.02
Average														27.00	268.5	0.8340	43,124	2,006.50	0.3791	22.02

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Test on : 11 April 2008
Tested Fuel : CPO 10% & Solar 90%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7,6 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 50 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement											Result					
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	51	6.32.75	220.7	1.8	28	25	71	28				2.0	113	0.8420	42,483	467.47	0.8255	10.27
2	500	1500	51	6.33.28	220.1	1.8	28	25	75	28				2.5	119	0.8420	42,483	466.84	0.8255	10.27
Average														2.25	116.0	0.8420	42,483	467.16	0.8255	10.27
1	1000	1500	82	5.09.60	220.9	3.9	31	25	72	28				3.4	139	0.8420	42,483	953.49	0.5134	16.51
2	1000	1500	82	5.09.30	220.8	3.9	31	25	72	28				3.5	140	0.8420	42,483	954.41	0.5134	16.51
Average														3.45	139.5	0.8420	42,483	953.95	0.5134	16.51
1	1500	1500	101	4.09.50	220.6	6.0	29	25	75	28				10.1	174	0.8420	42,483	1,456.73	0.4168	20.33
2	1500	1500	101	4.09.40	220.6	6.0	29	25	75	28				12.1	173	0.8420	42,483	1,457.90	0.4168	20.33
Average														11.10	173.5	0.8420	42,483	1,457.31	0.4168	20.33
1	2000	1500	107	3.13.15	220.5	7.9	30	25	82	28				35.0	228	0.8420	42,483	1,990.70	0.3935	21.54
2	2000	1500	107	3.11.04	220.8	7.9	30	25	85	28				37.0	233	0.8420	42,483	2,016.33	0.3935	21.54
Avorage														36.00	230.5	0.8420	42,483	2,003.51	0.3935	21.54

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Test on : 12 April 2008
Tested Fuel : CPO 20% & Solar 80%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6 Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 20 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement											Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	52	6.34.88	221.4	1.7	29	25	74	28				4,2	113	0.8560	41,841	474.07	0.8231	10.45
2	500	1500	52	6.39.84	220.7	1.7	29	25	75	28				5.4	114	0.8560	41,841	468.19	0.8231	10.45
Average														4.80	113.5	0.8560	41,841	471.13	0.8231	10.45
1	1000	1500	84	5.16.19	220.7	3.7	29	25	80	28				7.1	144	0.8560	41,841	956.39	0.5095	16.69
2	1000	1500	84	5.16.94	220.9	3.8	29	25	81	28				7.4	145	0.8560	41,841	954.12	0.5095	16.89
Average														7.25	144.5	0.8560	41,841	955.26	0.5095	16.89
1	1500	1500	101	4.11.25	220.2	5.9	29	25	81	28				14.7	178	0.8560	41,841	1,447.16	0.4238	20.30
2	1500	1500	101	4.10.56	220.1	5.9	29	25	81	28				15.1	178	0.8560	41,841	1,451.15	0.4238	20.30
Average														14.90	178.0	0.8560	41,841	1,449.16	0.4238	20.30
1	2000	1500	106	3.13.41	220.5	8.0	30	25	88	28				25.0	226	0.8560	41,841	1,973.01	0.4038	21.31
2	2000	1500	106	3.12.72	220.1	8.0	30	25	89	28				25.0	225	0.8560	41,841	1,980.07	0.4038	21.31
Average														25.00	225.5	0.8560	41,841	1,976.54	0.4038	21.31

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Test on : 6 April 2008
Tested Fuel : CPO 25% & Solar 75%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4. Engine Piston Stroke (S) : 8,0 cm
5. No. of Cylindor (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 25 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101,325 kPa

TEST NO.	Set or command		Measurement												Result					
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	52	6.40.98	221.5	1.4	29	25	73	28				5.3	129	0.8580	41,521	466.88	0.8250	10.51
2	500	1500	53	6.44.62	221.5	1.5	29	25	71	28				5.1	128	0.8580	41,521	471.55	0.8094	10.71
Average														5.20	128.5	0.8580	41,521	469.20	0.8172	10.61
1	1000	1500	84	5.25.44	220.5	3.7	29	25	72	28				10.0	156	0.8580	41,521	929.20	0.5107	16.98
2	1000	1500	84	5.26.53	220.5	3.6	29	25	72	28				8.2	156	0.8580	41,521	926.10	0.5107	16.98
Average														9.10	157.0	0.8580	41,521	927.65	0.5107	16.98
1	1500	1500	102	4.10.73	220.7	5.7	31	25	79	28				15.1	200	0.8580	41,521	1,464.52	0.4206	20.61
2	1500	1500	102	4.12.13	220.6	5.8	31	25	76	28				17.2	204	0.8580	41,521	1,456.39	0.4206	20.61
Average														16.15	202.0	0.8580	41,521	1,460.46	0.4206	20.61
1	2000	1500	107	3.11.72	220.7	7.9	30	25	80	28				32.7	250	0.8580	41,521	2,009.18	0.4009	21.63
2	2000	1500	107	3.18.55	220.6	7.9	30	25	79	28				31.6	249	0.8580	41,521	1,940.07	0.4009	21.63
Average														32.15	249.5	0.8580	41,521	1,974.62	0.4009	21.63

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Test on : 12 April 2008
Tested Fuel : CPO 30% & Solar 70%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No of cycle : 4 cycle
2. Displacement (V) : 0,363 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Rate : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 30 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_f	T_0	T_1	T_2	Opacity	T_g	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	52	6.38.43	220.2	1.7	30	25	74	28				7.5	110	0.8610	41,200	469.84	0.8279	10.55
2	500	1500	52	6.35.53	220.9	1.7	30	25	75	28				6.9	110	0.8610	41,200	473.29	0.8279	10.55
Average														7.20	110.0	0.8610	41,200	471.57	0.8279	10.55
1	1000	1500	84	5.16.88	220.4	3.8	29	25	79	28				6.1	138	0.8610	41,200	954.91	0.5125	17.05
2	1000	1500	84	5.16.31	220.2	3.8	29	25	79	28				6.1	138	0.8610	41,200	956.02	0.5125	17.05
Average														6.10	138.0	0.8610	41,200	955.47	0.5125	17.05
1	1500	1500	101	4.09.10	220.5	5.9	28	25	84	28				10.1	161	0.8610	41,200	1,459.65	0.4262	20.50
2	1500	1500	101	4.08.59	220.5	5.9	28	25	86	28				9.9	166	0.8610	41,200	1,462.65	0.4262	20.50
Average														10.00	163.5	0.8610	41,200	1,461.15	0.4262	20.50
1	2000	1500	108	3.13.16	220.9	8.0	28	25	88	28				18.0	221	0.8610	41,200	2,012.84	0.3986	21.92
2	2000	1500	108	3.13.71	220.7	8.0	28	25	88	28				18.0	222	0.8610	41,200	2,007.12	0.3986	21.92
Average														18.00	221.5	0.8610	41,200	2,009.98	0.3986	21.92

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Test on : 12 April 2008
Tested Fuel : CPO 40% & Solar 60%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,383 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 40 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement											Exhaust Gas Analyzer		Result: Fuel Specification		Result: Diesel Genset Performance		
	Electriony Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature										
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	52	6.31.53	220.8	1.8	26	25	72	28				9.6	108	0.8680	40,559	478.12	0.8346	10.53
2	500	1500	52	6.34.19	220.7	1.8	26	25	72	28				8.9	108	0.8680	40,559	474.90	0.8346	10.53
Average														9.25	108.0	0.8680	40,559	476.51	0.8346	10.53
1	1000	1500	83	5.14.65	220.1	3.9	27	25	74	28				7.3	133	0.8680	40,559	949.63	0.5229	16.97
2	1000	1500	83	5.16.03	220.3	3.9	27	25	74	28				7.1	133	0.8680	40,559	945.48	0.5229	16.97
Average														7.20	133.0	0.8680	40,559	947.55	0.5229	16.97
1	1500	1500	100	4.03.91	220.7	6.0	28	25	78	28				8.2	169	0.8680	40,559	1,475.95	0.4340	20.45
2	1500	1500	100	4.04.09	220.9	6.0	28	25	78	28				9.6	169	0.8680	40,559	1,474.87	0.4340	20.45
Average														8.90	169.0	0.8680	40,559	1,475.41	0.4340	20.45
1	2000	1500	107	3.09.78	221.5	8.0	30	25	86	28				36.0	228	0.8680	40,559	2,029.72	0.4056	21.88
2	2000	1500	106	3.11.19	221.2	8.0	30	25	86	28				35.0	228	0.8680	40,559	1,995.92	0.4094	21.68
Average														36.50	228.0	0.8680	40,559	2,012.82	0.4075	21.78

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Test on : 11 April 2008
Tested Fuel : CPO 50% & Solar 50%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder ,4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 5,1 HP at 2200 rpm

1 No of cycle : 4 cycle
2 Displacement (V) : 0,353 Lt
3 Engine Cylinder Bore (D) : 7,5 cm
4 Engine Piston Stroke (S) : 8,0 cm
5 No of Cylinder (n) : 1
6 Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 50 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement											Result					
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_f	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_m
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/cm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	51	6.23,90	220.9	1.5	32	25	77	28				5.1	117	0.8740	39,918	478.25	0.8569	10.53
2	500	1500	51	6.29.18	220.6	1.5	32	25	77	28				4.3	117	0.8740	39,918	471.76	0.8569	10.53
Average														4.70	117.0	0.8740	39,918	475.01	0.8569	10.53
1	1000	1500	83	5.13.09	221.5	3.6	32	25	79	28				7.0	143	0.8740	39,918	954.36	0.5265	17.13
2	1000	1500	82	5.14.38	220.4	3.6	32	25	79	28				7.0	143	0.8740	39,918	938.99	0.5329	16.92
Average														7.00	143.0	0.8740	39,918	946.67	0.5297	17.03
1	1500	1500	98	4.10.73	220.7	5.7	34	25	86	28				5.6	165	0.8740	39,918	1,407.09	0.4459	20.22
2	1500	1500	98	4.12.13	220.6	5.8	34	25	84	28				6.7	166	0.8740	39,918	1,399.28	0.4459	20.22
Average														6.15	165.5	0.8740	39,918	1,403.18	0.4459	20.22
1	2000	1500	105	3.10.50	215.7	7.8	33	25	88	23				20.8	218	0.8740	39,918	1,984.25	0.4162	21.67
2	2000	1500	105	3.06.07	221.5	7.8	33	25	87	28				28.5	216	0.8740	39,918	2,031.49	0.4162	21.67
Average														24.65	217.0	0.8740	39,918	2,007.87	0.4162	21.67

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Test on : 3 Desember 2007
Tested Fuel : CPO
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 25 mL
2. Percentage of CPO : 100 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement									Exhaust Gas Analyzer		Result: Fuel Specification		Result: Diesel Genset Performance		
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Fuel Temperature										
	-	N	E	t	V	A	T_a	Tts	T_0	T_1	T_2	Opacity	Tg	γ	LHV	W	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	24.00	2.58.53	222.30	1.80	29.00	80.00	82.00	61.50	72.60	2.80	143.00	0.8800	36,711	483.95	0.9167	10.70
2	500	1500	24.00	2.58.47	213.00	1.70	29.00	80.00	98.00	60.30	66.00	2.30	143.00	0.8800	36,711	484.11	0.9167	10.70
Average												2.55	143.0	0.8800	36,711	484.03	0.9167	10.70
1	500	1500	23.00	3.02.38	220.00	1.60	30.00	90.00	95.00	70.10	72.00	2.80	146.00	0.8740	36,711	454.00	0.9500	10.32
2	500	1500	23.00	3.07.22	218.20	1.60	31.00	90.00	96.00	70.20	72.30	3.80	153.00	0.8740	36,711	442.00	0.9500	10.32
Average												3.30	149.5	0.8740	36,711	448.00	0.9500	10.32
1	500	1500	23.00	2.54.91	219.00	1.80	27.00	110.00	116.00	80.50	81.20	3.30	135.00	0.8680	36,711	473.39	0.9435	10.39
2	500	1500	23.00	2.52.19	217.50	1.80	28.00	110.00	115.00	80.40	81.10	3.60	147.00	0.8680	36,711	480.86	0.9435	10.39
Average												3.45	141.0	0.8680	36,711	477.13	0.9435	10.39
1	500	1500	23.00	2.50.91	222.10	1.80	27.00	140.00	>140	90.40	90.80	2.40	147.00	0.8620	36,711	484.47	0.9370	10.47
2	500	1500	23.00	2.52.16	222.50	1.80	27.00	140.00	>140	90.30	90.90	2.60	150.00	0.8620	36,711	480.95	0.9370	10.47
Average												2.50	148.5	0.8620	36,711	482.71	0.9370	10.47

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Test on : 3 Desember 2007
Tested Fuel : CPO
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No of cycle : 4 cycle
2 Displacement (V) : 0,353 Lt
3 Engine Cylinder Bore (D) : 7,5 cm
4 Engine Piston Stroke (S) : 8,0 cm
5 No of Cylinder (n) : 1
6 Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2 Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 25 mL
2. Percentage of CPO : 100 %

TEST CONDITIONS

1 Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement									Exhaust Gas Analyzer		Result: Fuel Specification		Result: Diesel Genset Performance		
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suroon Air Temp	Fuel Temperature										
	-	N	E	t	V	A	T_a	T_{fs}	T_0	T_1	T_2	Opacity	Tg	γ	LHV	W	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	24.00	2.58.53	222.30	1.80	29.00	80.00	82.00	61.50	72.60	2.80	143.00	0.8800	36,711	483.95	0.9167	10.70
2	500	1500	24.00	2.58.47	213.00	1.70	29.00	80.00	98.00	60.30	66.00	2.30	143.00	0.8800	36,711	484.11	0.9167	10.70
Average												2.55	143.0	0.8800	36,711	484.03	0.9167	10.70
1	500	1500	23.00	3.02.38	220.00	1.60	30.00	90.00	95.00	70.10	72.00	2.80	146.00	0.8740	36,711	454.00	0.9500	10.32
2	500	1500	23.00	3.07.22	218.20	1.60	31.00	90.00	96.00	70.20	72.30	3.80	153.00	0.8740	36,711	442.00	0.9500	10.32
Average												3.30	149.5	0.8740	36,711	448.00	0.9500	10.32
1	500	1500	23.00	2.54.91	219.00	1.80	27.00	110.00	116.00	80.50	81.20	3.30	135.00	0.8680	36,711	473.39	0.9435	10.39
2	500	1500	23.00	2.52.19	217.50	1.80	28.00	110.00	115.00	80.40	81.10	3.60	147.00	0.8680	36,711	480.86	0.9435	10.39
Average												3.45	141.0	0.8680	36,711	477.13	0.9435	10.39
1	500	1500	23.00	2.50.91	222.10	1.80	27.00	140.00	>140	90.40	90.80	2.40	147.00	0.8620	36,711	484.47	0.9370	10.47
2	500	1500	23.00	2.52.16	222.50	1.80	27.00	140.00	>140	90.30	90.90	2.60	150.00	0.8620	36,711	480.95	0.9370	10.47
Average												2.50	148.5	0.8620	36,711	482.71	0.9370	10.47

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Test on : 7 Desember 2007
Tested Fuel : CPO
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.6 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 28 mL
2. Percentage of CPO : 100 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement									Result						
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{ls}	T_o	T_1	T_2	Opacity	Tg	γ	LHV	W	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1500	1500	46	1.55.47	214.0	5.7	28	80	91	60.2	67.4	11.8	231	0.8800	36,711	1434.14	0.4783	20.50
2	1500	1500	46	1.53.91	215.0	5.7	27	80	82	60.6	66.6	10.7	233	0.8800	36,711	1453.78	0.4783	20.50
Average												11.25	232.0	0.8800	36,711	1,443.96	0.4783	20.50
1	1500	1500	43	1.48.50	215.5	5.9	27	90	100	70.3	70.5	9.8	241	0.8740	36,711	1426.73	0.5081	19.30
2	1500	1500	43	1.48.53	216.5	5.9	25	90	100	70.4	70.6	10.5	239	0.8740	36,711	1426.33	0.5081	19.30
Average												10.15	240.0	0.8740	36,711	1,426.53	0.5081	19.30
1	1500	1500	44	1.49.06	220.0	5.9	29	110	120	80.7	81.1	8.0	236	0.8680	36,711	1,452.41	0.4932	19.88
2	1500	1500	44	1.48.38	218.5	5.9	29	110	120	80.2	80.9	9.6	239	0.8680	36,711	1,461.52	0.4932	19.88
Average												8.80	237.5	0.8680	36,711	1,456.97	0.4932	19.88
1	1500	1500	44	1.49.22	216.4	5.9	26	140	>140	89.9	90.6	8.2	237	0.8620	36,711	1,450.28	0.4898	20.02
2	1500	1500	44	1.48.97	216.7	5.9	25	140	>140	90.5	91.0	8.5	236	0.8620	36,711	1,453.61	0.4898	20.02
Average												8.35	236.5	0.8620	36,711	1,451.95	0.4898	20.02

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Kampus Baru UI, Depok 16424

Test on : 8 Desember 2007
Tested Fuel : CPO
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 25 mL
2. Percentage of CPO : 100 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement									Result					
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{fs}	T_o	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	2000	1500	47.0	1.36.00	203.0	7.5	28	80	93	59.6	69.6	43.7	290	0.8800	36,711	1,762.50	0.4681	20.95
2	2000	1500	48.0	1.36.90	203.0	7.5	29	80	83	59.9	71.6	41.8	295	0.8800	36,711	1,783.28	0.4583	21.40
Average												42.75	292.5	0.8800	36,711	1,772.89	0.4632	21.17
1	2000	1500	47.00	1.26.06	214.5	7.9	27.00	90.00	100	70.5	70.7	36.7	308	0.8740	36,711	1,966.07	0.4649	21.09
2	2000	1500	47.00	1.25.93	215.7	7.9	27.00	90.00	100	70.4	70.6	32.8	302	0.8740	36,711	1,969.04	0.4649	21.09
Average												34.75	305.0	0.8740	36,711	1,967.56	0.4649	21.09
1	2000	1500	46.0	1.21.28	221.6	8.1	27	130	>130	80.5	81.2	44.0	322	0.8680	36,711	2,037.40	0.4717	20.79
2	2000	1500	46.0	1.21.84	220.3	8.1	28	130	>130	80.1	81.0	43.0	324	0.8680	36,711	2,023.46	0.4717	20.79
Average												43.50	323.0	0.8680	36,711	2,030.43	0.4717	20.79
1	2000	1500	46.0	1.21.03	221.6	8.1	27	150	>150	90.6	90.5	38.0	321	0.8620	36,711	2,043.69	0.4685	20.93
2	2000	1500	46.0	1.20.47	222.3	8.1	26	150	>150	90.5	90.7	37.6	317	0.8620	36,711	2,057.91	0.4685	20.93
Average												37.80	319.0	0.8620	36,711	2,050.80	0.4685	20.93

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Test on : 20 April 2008
Tested Fuel : CPO 100
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No of Cylindar (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 100 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101,325 kPa

TEST NO.	Set or command		Measurement												Exhaust Gas Analyzer		Result: Fuel Specification		Result: Diesel Genset Performance		
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature											
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_f	T_0	T_1	T_2		Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C		k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	47	5.57.90	220.7	1.6	30	25	85	90	110	60.3	69.3		5.7	131	0.8800	36,711	472.76	0.9362	10.47
2	500	1500	47	5.57.94	220.9	1.6	30	25	82	90	110	60.2	69.3		5.7	131	0.8800	36,711	472.70	0.9362	10.47
Average															5.7	131.0	0.8800	36,711	472.73	0.9362	10.47
1	500	1500	47	6.01.53	220.5	1.7	31	25	76	110	>120	70.8	72.3		6.1	125	0.8740	36,711	468.01	0.9298	10.55
2	500	1500	47	6.01.50	220.6	1.7	31	25	76	110	>120	70.9	70.7		4.8	125	0.8740	36,711	468.05	0.9298	10.55
Average															5.5	125.0	0.8740	36,711	468.03	0.9298	10.55
1	500	1500	47	6.00.44	220.7	1.7	29	25	82	130	>130	81.5	83.5		4.7	127	0.8680	36,711	469.43	0.9234	10.62
2	500	1500	46	5.58.81	220.8	1.7	29	25	82	130	>130	80.3	83.6		5.7	127	0.8680	36,711	461.53	0.9435	10.39
Average															5.2	127.0	0.8680	36,711	465.48	0.9334	10.51
1	500	1500	46	5.56.09	220.8	1.8	29	25	76	140	>140	90.9	93.8		4.6	124	0.8820	36,711	465.05	0.9370	10.47
2	500	1500	46	5.56.00	220.9	1.8	29	25	77	140	>140	90.5	93.9		4.7	124	0.8820	36,711	465.13	0.9370	10.47
Average															4.7	124.0	0.8820	36,711	465.09	0.9370	10.47

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Test on : 20 April 2008
Tested Fuel : CPO 100
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.6 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 100 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement											Exhaust Gas Analyzer		Result: Fuel Specification		Result: Diesel Genset Performance		
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature										
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1000	1500	75	4.50.18	219.0	3.9	30	25	82	70	80	61.5	69.3	5.4	156	0.8600	36,711	930.46	0.5867	16.72
2	1000	1500	75	4.51.18	219.0	3.9	30	25	82	70	82	59.5	69.3	5.1	156	0.8600	36,711	927.26	0.5867	16.72
Average														5.3	156.0	0.8600	36,711	928.86	0.5867	16.72
1	1000	1500	74	4.46.44	219.1	3.9	29	25	83	90	114	71.3	72.3	5.1	155	0.8740	36,711	930.04	0.5905	16.61
2	1000	1500	74	4.45.31	219.2	3.9	29	25	83	90	114	70.1	70.7	5.3	155	0.8740	36,711	933.72	0.5905	16.61
Average														5.2	155.0	0.8740	36,711	931.88	0.5905	16.61
1	1000	1500	74	4.43.81	219.9	3.9	29	25	82	130	>130	80.8	83.5	5.1	155	0.8680	36,711	938.66	0.5865	16.72
2	1000	1500	74	4.43.75	219.8	3.9	29	25	82	130	>130	81.3	83.6	5.1	155	0.8680	36,711	938.85	0.5865	16.72
Average														5.1	155.0	0.8680	36,711	938.76	0.5865	16.72
1	1000	1500	74	4.41.31	220.7	3.9	29	25	82	140	>140	90.5	93.5	4.5	155	0.8620	36,711	947.00	0.5824	16.84
2	1000	1500	74	4.43.03	220.8	3.9	29	25	82	140	>140	89.5	93.9	4.5	155	0.8620	36,711	941.24	0.5824	16.84
Average														4.5	155.0	0.8620	36,711	944.12	0.5824	16.84

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Test on : 23 April 2008
Tested Fuel : CPO 100%
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,363 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4. Engine Piston Stroke (S) : 8,0 cm
5. No. of Cylindor (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 100 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101,325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_b	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1500	1500	91	3,42.94	220.7	5.9	30	25	84	70	94	60.7	68.7	7.5	196	0.8800	36,711	1,469.45	0.4835	20.28
2	1500	1500	91	3,42.28	220.7	5.9	30	25	84	70	94	60.9	68.5	7.9	196	0.8800	36,711	1,473.82	0.4835	20.28
Average														7.7	196.0	0.8800	36,711	1,471.64	0.4835	20.28
1	1500	1500	90	3,42.81	220.4	5.9	30	25	84	80	110	70.9	70.9	7.8	199	0.8740	36,711	1,454.15	0.4856	20.20
2	1500	1500	89	3,41.00	220.5	5.9	30	25	84	80	110	69.7	70.2	8.1	199	0.8740	36,711	1,449.77	0.4910	19.97
Average														8.0	199.0	0.8740	36,711	1,451.96	0.4883	20.08
1	1500	1500	86	3,30.75	220.2	5.9	31	25	80	120	>120	81.5	83.2	8.0	202	0.8680	36,711	1,469.04	0.5047	19.43
2	1500	1500	87	3,31.31	220.3	5.9	31	25	80	120	>120	79.8	82.3	8.0	202	0.8680	36,711	1,482.18	0.4989	19.66
Average														8.0	202.0	0.8680	36,711	1,475.61	0.5018	19.54
1	1500	1500	87	3,32.65	220.1	5.9	31	25	81	130	>130	90.1	93.3	7.0	204	0.8620	36,711	1,471.48	0.4954	19.79
2	1500	1500	87	3,29.65	220.1	5.9	31	25	81	130	>130	88.5	93.9	7.0	204	0.8620	36,711	1,493.92	0.4954	19.79
Average														7.0	204.0	0.8620	36,711	1,482.69	0.4954	19.79

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Test on : 23 April 2008
Tested Fuel : CPO 100%
Engine No. : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,363 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4. Engine Piston Stroke (S) : 8,0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 100 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101,325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	2000	1500	94	2.47.53	220.1	8.0	31	25	91	70	82	60.5	73.5	33.0	275	0.8800	36,711	2,019.94	0.4681	20.95
2	2000	1500	94	2.48.91	220.0	8.0	31	25	91	70	82	60.3	73.5	33.0	275	0.8800	36,711	2,003.43	0.4681	20.95
Average														33.0	275.0	0.8800	36,711	2,011.69	0.4681	20.95
1	2000	1500	93	2.45.50	220.2	8.0	31	25	91	90	112	70.5	75.3	28.0	271	0.8740	36,711	2,022.96	0.4699	20.87
2	2000	1500	93	2.46.62	220.1	8.0	31	25	91	90	112	69.5	75.1	30.0	271	0.8740	36,711	2,009.36	0.4699	20.87
Average														29.0	271.0	0.8740	36,711	2,016.16	0.4699	20.87
1	2000	1500	90	2.41.32	220.5	8.0	32	25	87	100	>120	80.4	84.5	32.0	274	0.8680	36,711	2,008.43	0.4822	20.34
2	2000	1500	91	2.42.47	220.4	8.0	32	25	87	100	>120	80.1	83.9	32.0	274	0.8680	36,711	2,016.37	0.4769	20.56
Average														32.0	274.0	0.8680	36,711	2,012.40	0.4796	20.45
1	2000	1500	91	2.43.94	220.7	8.0	32	25	84	140	>140	93.5	94.1	33.0	271	0.8620	36,711	1,998.29	0.4736	20.70
2	2000	1500	89	2.41.50	220.8	8.0	32	25	84	140	>140	92.5	93.0	33.0	271	0.8620	36,711	1,983.90	0.4843	20.25
Average														33.0	271.0	0.8620	36,711	1,991.10	0.4789	20.48

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Test on : 19 April 2008
Tested Fuel : CPO 25% & Solar 75%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 25 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Exhaust Gas Analyzer		Result: Fuel Specification		Result: Diesel Genset Performance		
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature											
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2		Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C		k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	49	6.10.66	220.8	1.8	30	25	76	70	88	59.5	61.0		7.2	126	0.8380	41,521	475.91	0.8551	10.14
2	500	1500	49	6.11.66	220.9	1.8	30	25	76	70	88	60,1	61.2		7.8	126	0.8380	41,521	474.63	0.8551	10.14
Average															7.5	127.0	0.8380	41,521	475.27	0.8551	10.14
1	500	1500	49	6.13.81	221.2	1.7	30	25	75	80	92	71.3	73.6		11.6	129	0.8320	41,521	471.90	0.8490	10.21
2	500	1500	49	6.12.37	221.4	1.7	30	25	75	80	92	70.2	73,5		11.4	129	0.8320	41,521	473.72	0.8490	10.21
Average															11.5	129.0	0.8320	41,521	472.81	0.8490	10.21
1	500	1500	48	6.11.88	220.2	1.8	30	25	75	90	110	80.7	83.9		11.3	130	0.8260	41,521	464.67	0.8604	10.08
2	500	1500	48	6.11.10	220.1	1.8	30	25	75	90	110	80.2	81.5		11.2	130	0.8260	41,521	465.64	0.8604	10.08
Average															11.3	130.0	0.8260	41,521	465.15	0.8604	10.08
1	500	1500	48	6.08.78	220.8	1.8	29	25	74	110	>120	90.6	91.2		11.8	128	0.8200	41,521	468.57	0.8542	10.15
2	500	1500	48	6.12.94	220.9	1.8	29	25	74	110	>120	90.5	91.5		11.8	128	0.8200	41,521	463.35	0.8542	10.15
Average															11.8	128.0	0.8200	41,521	465.96	0.8542	10.15

Laboratorium Thermodinamika
Departemen Teknik, Universitas Indonesia
Kampus Baru UI, Depok 16424

Test on : 19 April 2008
Tested Fuel : CPO 25% & Solar 75%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 8,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,363 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 25 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1000	1500	77	4.54.50	219.7	3.9	28	25	81	70	80	60.1	66.4	12.1	158	0.8380	41,521	941.26	0.5442	15.93
2	1000	1500	77	4.54.72	219.6	3.9	28	25	81	70	82	59.5	66.7	12.3	158	0.8380	41,521	940.55	0.5442	15.93
Average														12.2	158.0	0.8380	41,521	940.91	0.5442	15.93
1	1000	1500	77	4.52.56	219.6	3.9	29	25	78	80	90	70.5	73.5	10.2	151	0.8320	41,521	947.50	0.5403	16.05
2	1000	1500	77	4.51.44	219.5	3.9	29	25	78	80	90	71.4	74.3	11.1	151	0.8320	41,521	951.14	0.5403	16.05
Average														10.7	151.0	0.8320	41,521	949.32	0.5403	16.05
1	1000	1500	76	4.49.28	220.5	3.9	30	25	75	90	110	80.5	82.1	17.8	160	0.8260	41,521	945.80	0.5434	15.96
2	1000	1500	76	4.50.75	220.4	3.9	30	25	75	90	110	80.7	81.3	8.1	160	0.8260	41,521	941.01	0.5434	15.96
Average														13.0	160.0	0.8260	41,521	943.41	0.5434	15.96
1	1000	1500	76	4.49.57	220.2	3.9	30	25	74	110	>120	90.3	92.5	11.5	151	0.8200	41,521	944.65	0.5395	16.07
2	1000	1500	77	4.51.06	220.1	3.9	30	25	74	110	>120	91.0	92.4	11.4	151	0.8200	41,521	952.38	0.5325	16.28
Average														11.5	151.0	0.8200	41,521	948.62	0.5360	16.18

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Kampus Baru UI, Depok 16424

Test on : 20 April 2008
Tested Fuel : CPO 25% & Solar 75%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2 Displacement (V) : 0,363 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4 Engine Piston Stroke (S) : 8,0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 25 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_f	T_0	T_1	T_2	Opacity	T_g	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1500	1500	95	3.54.47	220.7	5.8	30	25	86	70	76	61.9	71.3	17.0	198	0.8380	41,521	1,458.61	0.4411	19.66
2	1500	1500	95	3.56.60	220.6	5.8	30	25	86	70	76	61.5	71.2	17.0	198	0.8380	41,521	1,445.48	0.4411	19.66
Average														17.0	198.0	0.8380	41,521	1,452.04	0.4411	19.66
1	1500	1500	95	3.53.10	220.9	5.8	32	25	85	80	98	71.1	73.2	18.0	201	0.8320	41,521	1,467.18	0.4379	19.80
2	1500	1500	95	3.51.81	220.8	5.8	32	25	85	80	98	70.6	72.2	23.0	201	0.8320	41,521	1,475.35	0.4379	19.80
Average														20.5	201.0	0.8320	41,521	1,471.26	0.4379	19.80
1	1500	1500	95	3.53.81	220.8	5.8	34	25	87	90	92	80.1	83.2	18.0	208	0.8260	41,521	1,462.73	0.4347	19.94
2	1500	1500	95	3.52.66	220.7	5.8	34	25	87	90	92	80.2	83.3	21.0	208	0.8260	41,521	1,469.96	0.4347	19.94
Average														19.5	208.0	0.8260	41,521	1,466.34	0.4347	19.94
1	1500	1500	93	3.50.00	220.4	5.8	36	25	86	110	>120	91.2	93.5	21.0	210	0.8200	41,521	1,455.65	0.4409	19.67
2	1500	1500	93	3.48.69	220.6	5.8	36	25	86	110	>120	90.7	93.4	22.0	210	0.8200	41,521	1,463.99	0.4409	19.67
Average														21.5	210.0	0.8200	41,521	1,459.82	0.4409	19.67

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Test on : 20 April 2008
Tested Fuel : CPO 25% & Solar 75%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 5,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 25 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Preasure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Exhaust Gas Analyzer		Result: Fuel Specification		Result: Diesel Genset Performance		
	Electricity Lamp Load	Rotational/ Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature											
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2		Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C		k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	2000	1500	101	3,02.81	220.1	8.0	34	25	87	70	76	80.9	71.7		32.0	258	0.8380	41,521	1,988.95	0.4149	20.90
2	2000	1500	101	3.03.12	220.2	8.0	34	25	87	70	76	80.3	72.2		33.0	258	0.8380	41,521	1,985.58	0.4149	20.90
Average															32.5	258.0	0.8380	41,521	1,987.27	0.4149	20.90
1	2000	1500	100	3.00.31	220.4	8.0	32	25	88	80	96	70.2	73.5		40.0	257	0.8320	41,521	1,996.56	0.4160	20.84
2	2000	1500	101	3,01.69	220.3	8.0	32	25	88	80	96	70.1	74.1		36.0	257	0.8320	41,521	2,001.21	0.4119	21.05
Average															38.0	257.0	0.8320	41,521	1,998.89	0.4139	20.95
1	2000	1500	98	2,58.72	219.8	8.0	34	25	88	110	>120	81.5	81.5		38.0	257	0.8260	41,521	1,996.38	0.4214	20.57
2	2000	1500	99	2,59.15	219.7	8.0	34	25	88	110	>120	80.3	80.3		38.0	257	0.8260	41,521	1,989.39	0.4172	20.78
Average															38.0	257.0	0.8260	41,521	1,992.89	0.4193	20.68
1	2000	1500	99	2.59.00	220.3	8.0	34	25	87	130	>130	91.1	96.2		36.0	260	0.8200	41,521	1,991.06	0.4141	20.94
2	2000	1500	100	2.59.40	220.6	8.0	34	25	87	130	>130	91.3	91.3		32.0	260	0.8200	41,521	2,006.69	0.4100	21.15
Average															34.0	260.0	0.8200	41,521	1,998.88	0.4121	21.04

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Test on : 18 April 2008
Tested Fuel : CPO 50% & Solar 50%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4. Engine Piston Stroke (S) : 8,0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 50 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	49	6.16.40	220.7	1.7	33	26	75	70	80	60.5	60.4	4.7	143	0.8540	39,918	468.65	0.8714	10.35
2	500	1500	49	6.16.59	220.7	1.7	33	26	75	70	80	60.7	60.7	4.7	143	0.8540	39,918	468.41	0.8714	10.35
Average														4.7	143.0	0.8540	39,918	468.53	0.8714	10.35
1	500	1500	49	6.18.28	220.6	1.6	34	26	76	90	98	69.9	72.0	5.4	143	0.8470	39,918	466.32	0.8643	10.43
2	500	1500	49	6.21.25	221.4	1.6	34	26	78	90	98	70.9	71.2	5.2	143	0.8470	39,918	462.69	0.8643	10.43
Average														5.3	143.0	0.8470	39,918	464.50	0.8643	10.43
1	500	1500	49	6.21.09	220.5	1.6	35	26	75	90	98	80.2	81.9	4.9	144	0.8400	39,918	462.88	0.8571	10.52
2	500	1500	49	6.21.18	220.4	1.6	35	26	75	90	98	80.1	82.0	5.4	144	0.8400	39,918	462.77	0.8571	10.52
Average														5.2	144.0	0.8400	39,918	462.83	0.8571	10.52
1	500	1500	48	6.12.00	220.4	1.6	33	26	74	110	>120	90.8	91.1	4.7	141	0.8320	39,918	464.52	0.8667	10.41
2	500	1500	48	6.12.87	220.4	1.6	33	26	79	110	>120	91.2	93.0	4.8	141	0.8320	39,918	463.43	0.8667	10.41
Average														4.8	141.0	0.8320	39,918	463.97	0.8667	10.41

Laboratorium Thermodinamika
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Test on : 18 April 2008
Tested Fuel : CPO 50% & Solar 50%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 50 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1000	1500	79	4.55.84	221.3	3.8	30	26	79	70	84	60.0	62.7	3.9	173	0.8540	39,918	961.33	0.5405	16.69
2	1000	1500	79	4.56.53	221.5	3.8	30	26	79	70	84	59.5	63.5	4.4	173	0.8540	39,918	959.09	0.5405	16.69
Average														4.2	173.0	0.8540	39,918	960.21	0.5405	16.69
1	1000	1500	78	4.53.13	221.5	3.8	30	26	80	90	100	70.4	73.3	4.6	173	0.8470	39,918	957.94	0.5429	16.61
2	1000	1500	78	4.54.6	221.3	3.8	30	26	80	90	100	70.5	73.5	4.6	173	0.8470	39,918	953.16	0.5429	16.61
Average														4.6	173.0	0.8470	39,918	955.55	0.5429	16.61
1	1000	1500	78	4.55.72	221.5	3.9	31	26	80	110	>120	80.9	82.1	4.7	178	0.8400	39,918	949.55	0.5385	16.75
2	1000	1500	78	4.54.06	221.5	3.9	31	26	80	110	>120	81.5	84.3	4.7	178	0.8400	39,918	954.91	0.5385	16.75
Average														4.7	178.0	0.8400	39,918	952.23	0.5385	16.75
1	1000	1500	78	4.55.06	221.5	3.8	33	26	79	110	>120	90.2	94.7	5.0	179	0.8320	39,918	951.67	0.5333	16.91
2	1000	1500	78	4.55.63	221.4	3.8	33	26	81	110	>120	91.0	93.3	4.2	179	0.8320	39,918	949.84	0.5333	16.91
Average														4.6	179.0	0.8320	39,918	950.75	0.5333	16.91

Laboratorium Thermodinamika
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Test on : 19 April 2008
Tested Fuel : CPO 50% & Solar 50%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2 Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4. Engine Piston Stroke (S) : 8,0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 50 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101,325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1500	1500	93	3.53.28	220.1	5.7	33	26	87	80	90	60.8	74.3	18.1	210	0.8540	39,918	1,435.19	0.4591	19.64
2	1500	1500	93	3.52.12	220.2	5.7	33	26	83	80	90	60.5	73.9	16.9	210	0.8540	39,918	1,442.36	0.4591	19.64
Average														17.5	210.0	0.8540	39,918	1,438.77	0.4591	19.64
1	1500	1500	94	3.53.78	220.1	5.7	33	26	87	90	100	69.5	74.1	12.4	197	0.8470	39,918	1,447.51	0.4505	20.02
2	1500	1500	94	3.53.72	220.3	5.7	33	26	87	90	100	69.7	73.8	12.4	197	0.8470	39,918	1,447.89	0.4505	20.02
Average														12.4	197.0	0.8470	39,918	1,447.70	0.4505	20.02
1	1500	1500	93	3.49.38	220.3	5.8	33	26	86	120	>120	81.9	84.5	12.3	207	0.8400	39,918	1,459.59	0.4516	19.97
2	1500	1500	92	3.48.13	220.5	5.8	33	26	88	120	>120	81.7	83.1	12.8	207	0.8400	39,918	1,451.80	0.4565	19.76
Average														12.6	207.0	0.8400	39,918	1,455.70	0.4541	19.86
1	1500	1500	93	3.48.14	220.8	5.8	33	26	85	120	>120	90.3	91.2	11.8	202	0.8320	39,918	1,467.52	0.4473	20.16
2	1500	1500	93	3.48.09	220.8	5.8	33	26	85	120	>120	90.3	93.3	11.8	202	0.8320	39,918	1,467.84	0.4473	20.16
Average														11.8	202.0	0.8320	39,918	1,467.68	0.4473	20.16

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Kampus Baru UI, Depok 16424

Test on : 19 April 2008
Tested Fuel : CPO 50% & Solar 50%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2 Displacement (V) : 0,363 Lt
3 Engine Cylinder Bore (D) : 7.6 cm
4 Engine Piston Stroke (S) : 8.0 cm
5 No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 50 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_f	T_0	T_1	T_2	Opacity	T_g	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	2000	1500	100	2.59.37	220.8	8.0	32	26	88	70	84	61.2	72.5	30.0	260	0.8540	39,918	2,007.02	0.4270	21.12
2	2000	1500	100	2.58.94	220.9	8.0	32	26	88	70	84	60.1	71.2	26.0	260	0.8540	39,918	2,011.85	0.4270	21.12
Average														28.0	260.0	0.8540	39,918	2,009.44	0.4270	21.12
1	2000	1500	99	2.59.16	220.2	8.0	33	26	88	90	96	70.2	73.9	21.0	250	0.8470	39,918	1,989.28	0.4278	21.08
2	2000	1500	99	2.59.63	220.3	8.0	33	26	88	90	96	70.0	73.3	26.0	250	0.8470	39,918	1,984.08	0.4276	21.08
Average														23.5	250.0	0.8470	39,918	1,986.68	0.4278	21.08
1	2000	1500	98	2.57.60	219.5	8.0	31	26	86	130	>130	81.1	83.8	20.0	249	0.8400	39,918	1,986.49	0.4286	21.04
2	2000	1500	98	2.57.94	219.7	8.0	31	26	86	130	>130	80.6	83.2	22.0	249	0.8400	39,918	1,982.69	0.4286	21.04
Average														21.0	249.0	0.8400	39,918	1,984.59	0.4286	21.04
1	2000	1500	98	2.56.16	220.4	8.0	31	26	86	150	>150	91.7	93.5	28.0	255	0.8320	39,918	2,002.72	0.4245	21.25
2	2000	1500	97	2.55.62	220.4	8.0	31	26	86	150	>150	89.9	93.4	26.0	255	0.8320	39,918	1,988.38	0.4269	21.03
Average														27.0	255.0	0.8320	39,918	1,995.55	0.4267	21.14

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Kampus Baru UI, Depok 16424

Test on : 13 April 2008
Tested Fuel : CPO 75% & Solar 25%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.6 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 75 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101,325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	47	5.58.37	224.3	1.5	30	25	75	70	82	60.2	62.0	2.7	141	0.8670	38,314	472.14	0.9223	10.19
2	500	1500	48	5.59.28	224.5	1.5	30	25	78	70	81	60.3	63.0	2.6	141	0.8670	38,314	480.96	0.9031	10.40
Average														2.7	141.0	0.8670	38,314	476.55	0.9127	10.30
1	500	1500	47	6.03.65	220.9	1.6	31	25	75	90	112	71.8	72.9	2.9	135	0.8620	38,314	465.03	0.9170	10.25
2	500	1500	47	6.02.10	220.8	1.6	31	25	75	90	112	71.1	72.8	2.4	135	0.8620	38,314	467.27	0.9170	10.25
Average														2.7	135.0	0.8620	38,314	466.15	0.9170	10.25
1	500	1500	47	6.01.37	221.2	1.6	33	25	75	110	>120	81.5	82.3	2.7	125	0.8540	38,314	468.22	0.9085	10.34
2	500	1500	47	5.57.34	221.5	1.7	33	25	72	110	>120	81.9	82.5	2.4	126	0.8540	38,314	473.50	0.9085	10.34
Average														2.6	125.5	0.8540	38,314	470.86	0.9085	10.34
1	500	1500	44	5.33.12	221.7	1.7	32	25	74	130	>130	93.6	94.4	2.4	131	0.8500	38,314	475.39	0.9659	9.73
2	500	1500	44	5.34.47	222.3	1.7	32	25	74	130	>130	92.2	93.3	2.5	131	0.8500	38,314	473.59	0.9659	9.73
Average														2.5	131.0	0.8500	38,314	474.49	0.9659	9.73

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Test on : 16 April 2008
Tested Fuel : CPO 75% & Solar 25%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2 Displacement (V) : 0,363 Lt
3. Engine Cylinder Bore (D) : 7,5 cm
4. Engine Piston Stroke (S) : 8,0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 75 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101,325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1000	1500	76	4.53.03	220.1	3.8	30	25	79	80	90	80.4	84.1	3.4	148	0.8670	38,314	958.26	0.5558	16.91
2	1000	1500	76	4.53.60	220.9	3.8	30	25	82	80	90	80.5	87.4	3.4	148	0.8670	38,314	958.40	0.5558	16.91
Average														3.4	148.0	0.8670	38,314	957.33	0.5558	16.91
1	1000	1500	77	4.49.34	220.4	3.8	28	25	79	110	>120	70.1	73.3	2.7	151	0.8620	38,314	958.04	0.5597	16.79
2	1000	1500	77	4.50.50	220.7	3.8	29	25	79	110	>120	71.1	74.1	2.7	151	0.8620	38,314	954.22	0.5597	16.79
Average														2.7	151.0	0.8620	38,314	956.13	0.5597	16.79
1	1000	1500	76	4.48.91	221.3	3.8	30	25	82	140	>140	82.8	83.1	2.4	167	0.8540	38,314	947.01	0.5618	16.72
2	1000	1500	76	4.47.15	220.9	3.8	30	25	82	140	>140	82.0	83.2	2.6	167	0.8540	38,314	952.81	0.5618	16.72
Average														2.5	167.0	0.8540	38,314	949.91	0.5618	16.72
1	1000	1500	76	4.46.90	220.3	3.8	29	25	85	140	>140	92.1	94.4	2.7	168	0.8500	38,314	953.64	0.5592	16.80
2	1000	1500	76	4.46.37	220.9	3.8	29	25	85	140	>140	88.0	94.6	2.6	168	0.8500	38,314	955.41	0.5592	16.80
Average														2.7	168.0	0.8500	38,314	954.52	0.5592	16.80

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Test on : 18 April 2008
Tested Fuel : CPO 75% & Solar 25%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 Lt
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 75 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	1500	1500	91	3.47.44	220.5	5.8	33	26	80	90	90	62.8	64.1	9.0	202	0.8670	38,314	1,440.38	0.4764	19.72
2	1500	1500	91	3.47.47	220.4	5.8	33	26	80	90	90	61.9	67.4	8.3	204	0.8670	38,314	1,440.19	0.4764	19.72
Average														8.6	203.0	0.8670	38,314	1,440.28	0.4764	19.72
1	1500	1500	92	3.48.59	220.1	5.8	34	26	84	110	>120	71.7	73.3	8.3	214	0.8620	38,314	1,448.88	0.4685	20.06
2	1500	1500	92	3.48.25	220.2	5.8	34	26	84	110	>120	71.1	73.0	8.3	214	0.8620	38,314	1,451.04	0.4685	20.06
Average														8.3	214.0	0.8620	38,314	1,449.96	0.4685	20.06
1	1500	1500	92	3.47.97	220.5	5.8	34	26	84	110	>120	80.5	81.5	8.9	222	0.8540	38,314	1,452.82	0.4641	20.24
2	1500	1500	92	3.46.10	220.4	5.8	34	26	84	110	>120	80.8	82.1	8.9	222	0.8540	38,314	1,464.84	0.4641	20.24
Average														8.9	222.0	0.8540	38,314	1,458.83	0.4641	20.24
1	1500	1500	92	3.45.57	220.5	5.7	34	26	84	130	>130	89.8	91.5	7.9	224	0.8500	38,314	1,468.28	0.4620	20.34
2	1500	1500	92	3.45.18	221.3	5.7	34	26	84	130	>130	90.4	91.5	7.9	224	0.8500	38,314	1,470.82	0.4620	20.34
Average														7.9	224.0	0.8500	38,314	1,469.55	0.4620	20.34

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Test on : 18 April 2008
Tested Fuel : CPO 75% & Solar 25%
Engine No : 1

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1. No of cycle : 4 cycle
2. Displacement (V) : 0,363 Lt
3. Engine Cylinder Bore (D) : 7.6 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 75 %
3. Fuel Condition : Dengan Pemanasan

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	Tf	T_0	T_1	T_2	Opacity	Tg	γ	LHV	P	SFC	η_{in}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	2000	1500	98	2.55.63	220.8	7.9	34	26	86	80	90	60.6	68.5	33.0	292	0.8670	38,314	2,008.77	0.4423	21.24
2	2000	1500	97	2.54.81	220.8	7.9	34	26	86	80	90	60.3	68.5	33.0	292	0.8670	38,314	1,997.60	0.4469	21.02
Average														33.0	292.0	0.8670	38,314	2,003.18	0.4446	21.13
1	2000	1500	96	2.52.16	220.7	7.8	35	26	86	90	100	69.9	73.0	34.0	294	0.8620	38,314	2,007.43	0.4490	20.93
2	2000	1500	96	2.52.75	220.7	7.8	35	26	86	90	102	69.8	72.8	34.0	294	0.8620	38,314	2,000.58	0.4490	20.93
Average														34.0	294.0	0.8620	38,314	2,004.01	0.4490	20.93
1	2000	1500	95	2.51.78	220.9	7.6	37	26	89	130	>130	80.1	81.7	40.0	295	0.8540	38,314	1,990.92	0.4495	20.90
2	2000	1500	95	2.51.47	220.9	7.6	37	26	89	130	>130	79.5	82.3	40.0	295	0.8540	38,314	1,994.52	0.4495	20.90
Average														40.0	295.0	0.8540	38,314	1,992.72	0.4495	20.90
1	2000	1500	95	2.53.54	218.8	7.6	37	26	90	130	>130	91.5	92.0	41.0	297	0.8500	38,314	1,970.73	0.4474	21.00
2	2000	1500	94	2.52.75	218.7	7.6	37	26	90	130	>130	91.3	92.5	41.0	297	0.8500	38,314	1,958.90	0.4521	20.78
Average														41.0	297.0	0.8500	38,314	1,964.81	0.4497	20.89

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Test on : 25 April 2008
Tested Fuel : Solar 100%
Engine No. : 2

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm
1 No. of cycle : 4 cycle
2 Displacement (V) : 0,353 L
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8.0 cm
5. No. of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 0 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotasional Generator Shaft Speed	kWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_{fs}	T_0	T_1	T_2	Opacity	Tg	γ	LHV	W	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	51	6.35.75	219.7	1.5	30	25	70	28	NA	NA	NA	4.0	137	0.8340	43,124	463.93	0.8176	10.21
2	500	1500	51	6.34.31	220.1	1.5	30	25	70	28	NA	NA	NA	5.7	137	0.8340	43,124	465.62	0.8176	10.21
Average														4.85	137.0	0.8340	43,124	464.78	0.8176	10.21
1	1000	1500	82	5.10.81	220.5	3.6	32	25	78	28	NA	NA	NA	7.8	170	0.8340	43,124	949.78	0.5085	16.42
2	1000	1500	81	5.10.62	220.2	3.6	32	25	79	28	NA	NA	NA	8.1	170	0.8340	43,124	938.77	0.5148	16.22
Average														7.85	170.0	0.8340	43,124	944.27	0.5117	16.32
1	1500	1500	99	4.09.04	220.1	5.7	33	25	82	28	NA	NA	NA	11.2	218	0.8340	43,124	1,431.10	0.4212	19.82
2	1500	1500	98	4.08.60	220.1	5.7	33	25	82	28	NA	NA	NA	11.2	218	0.8340	43,124	1,419.15	0.4255	19.62
Average														11.20	218.0	0.8340	43,124	1,425.12	0.4234	19.72
1	2000	1500	104	3.09.98	220.2	7.9	35	25	90	28	NA	NA	NA	27.0	281	0.8340	43,124	1,970.94	0.4010	20.82
2	2000	1500	104	3.10.54	220.2	7.9	35	25	90	28	NA	NA	NA	31.0	281	0.8340	43,124	1,964.94	0.4010	20.82
Average														29.00	281.0	0.8340	43,124	1,967.94	0.4010	20.82

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Test on : 30 Mei 2008
Tested Fuel : Solar 100%
Engine No. : 2

DATA SHEET AND TEST RESULT

ENGINE : Dong Feng Diesel Engine
MODEL : R-175
TYPE : 1 Cylinder -4 Stroke - Horizontal

DIESEL ENGINE

Normal Output 6,1 HP at 2200 rpm

1. No. of cycle : 4 cycle
2. Displacement (V) : 0,353 L
3. Engine Cylinder Bore (D) : 7.5 cm
4. Engine Piston Stroke (S) : 8,0 cm
5. No of Cylinder (n) : 1
6. Compression Ratio : 21-23

GENERATOR

1. Model : ST-3-2
2. Type : Synchronous Generator
3. Output Power : 3 kW
4. Pole No. : 2

FUEL

1. Fuel Consumption : 50 mL
2. Percentage of CPO : 0 %

TEST CONDITIONS

1. Atmospheric Pressure (P_a) : 101.325 kPa

TEST NO.	Set or command		Measurement												Result				
	Electricity Lamp Load	Rotational Generator Shaft Speed	KWh Meter	Fuel Consuming Time	Voltage Meter	Ampere Meter	Suction Air Temp	Cooling Water Temp		Fuel Temperature				Exhaust Gas Analyzer		Fuel Specification		Diesel Genset Performance		
	-	N	E	t	V	A	T_a	T_{in}	T_{out}	T_{fs}	T_0	T_1	T_2	Opacity	Tg	γ	LHV	W	SFC	η_{th}
	Watt	rpm	Wh	sec	Volt	Ampere	°C	°C	°C	°C	°C		°C	k	°C	kg/dm³	kJ/kg	Watt	kg/kWh	%
1	500	1500	50	6.30.06	219.7	1.4	30	28	78	28	NA	NA	NA	3.4	151	0.8340	43,124	461.47	0.8340	10.01
2	500	1500	50	6.28.46	220.1	1.4	30	28	78	28	NA	NA	NA	3.0	152	0.8340	43,124	463.37	0.8340	10.01
Average														3.20	151.5	0.8340	43,124	462.42	0.8340	10.01
1	1000	1500	81	5.12.69	220.5	3.4	32	28	80	28	NA	NA	NA	8.7	189	0.8340	43,124	932.55	0.5148	16.22
2	1000	1500	81	5.11.76	220.2	3.4	32	28	80	28	NA	NA	NA	8.7	189	0.8340	43,124	935.33	0.5148	16.22
Average														8.70	189.0	0.8340	43,124	933.94	0.5148	16.22
1	1500	1500	98	4.04.00	220.1	5.6	33	28	83	28	NA	NA	NA	13.0	240	0.8340	43,124	1,445.90	0.4255	19.62
2	1500	1500	98	4.03.75	220.1	5.6	33	28	82	28	NA	NA	NA	13.5	240	0.8340	43,124	1,447.38	0.4255	19.62
Average														13.25	240.0	0.8340	43,124	1,446.64	0.4255	19.62
1	2000	1500	103	3.04.00	220.2	8.0	35	28	89	28	NA	NA	NA	38.0	328	0.8340	43,124	2,015.22	0.4049	20.62
2	2000	1500	103	3.03.81	220.2	8.0	35	28	89	28	NA	NA	NA	39.0	328	0.8340	43,124	2,017.30	0.4049	20.62
Average														38.50	328.0	0.8340	43,124	2,016.26	0.4049	20.62

LAMPIRAN 2

Data Hasil Pengujian Cetane Number

LABORATORIUM PENGUJIAN CETANE NUMBER
LEMIGAS, CILEDUK RAYA KAV. 109 CIPULIR
KEBAYORAN LAMA
JAKARTA SELATAN

LABORATORIUM TEST REPORT

PENGUJIAN : CETANE NUMBER
SAMPEL ID : SOLAR, CPO
METODA : ASTM D-613
MESIN : CFR WAUKESA ENGINE
TANGGAL DITERIMA : 8 APRIL 2008
TANGGAL SELESAI : 10 APRIL 2008

NO	URAIAN JENIS BAHAN BAKAR	HASIL	METODE
1	SOLAR MURNI	52.2	ASTM D 613
2	CPO 25 % + SOLAR 75 %	53.0	ASTM D 613
3	CPO 50 % + SOLAR 50 %	53.9	ASTM D 613
4	CPO 75 % + SOLAR 25 %	52.2	ASTM D 613
5	CPO 100 %	-	ASTM D 613

JAKARTA, 10 APRIL 2008
PELAKSANA,

PRAYOGI

LAMPIRAN 3

Data Hasil Pengujian Density dan Viscosity

DATA DENSITY

CPO 100%

TEMPERATUR (°C)	DENSITY (GR/ML)
28	0.904
60	0.88
70	0.874
80	0.868
90	0.862

CPO 75%

TEMPERATUR (°C)	DENSITY (GR/ML)
28.5	0.888
60	0.867
70	0.862
80	0.854
90	0.850

CPO 50%

TEMPERATUR (°C)	DENSITY (GR/ML)
29	0.874
60	0.854
70	0.847
80	0.84
90	0.832

CPO 25 %

TEMPERATUR (°C)	DENSITY (GR/ML)
28	0.858
60	0.838
70	0.832
80	0.826
90	0.820

SOLAR 100 %

TEMPERATUR (°C)	DENSITY (GR/ML)
30	0.834
60	0.814
70	0.808
80	0.800
90	0.793

CPO 40 %

TEMPERATUR (°C)	DENSITY (GR/ML)
28	0.868

CPO 30 %

TEMPERATUR (°C)	DENSITY (GR/ML)
29	0.861

CPO 20 %

TEMPERATUR (°C)	DENSITY (GR/ML)
28	0.858

CPO 10 %

TEMPERATUR (°C)	DENSITY (GR/ML)
28	0.842

DATA VISCOSITY

CPO 100%

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
28	387.82	388.57	385.22	387.20	85.57
60	101.12	100.79	100.25	100.72	22.26
70	79.82	79.96	80.2	79.99	17.68
80	61.83	61.99	62.77	62.20	13.75
90	49.73	48.6	53.56	50.63	11.19

CPO 75%

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
28	167.97	167	167.87	167.61	37.04
60	56.93	57.19	57.39	57.17	12.63
70	47.88	47.59	46.58	47.35	10.46
80	39.87	39.82	39	39.56	8.74
90	31.88	31.74	31.38	31.67	7.00

CPO 50%

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
29	101.37	103.02	99.97	101.45	22.42
60	38.07	37.63	37.39	37.70	8.33
70	29.55	29.86	30.3	29.90	6.61
80	25.77	25.49	25.78	25.68	5.68
90	20.38	20.7	20.48	20.51	4.53

CPO 25 %

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
28	42.2	42.49	42.49	42.39	9.37
60	20.3	20.59	20.77	20.55	4.54
70	16.76	16.54	16.28	16.53	3.65
80	14.61	14.3	14.24	14.38	3.18
90	13.32	13.25	13.02	13.20	2.92

SOLAR 100 %

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
31	20.42	20.46	20.45	20.44	4.52
60	11.2	11.3	11.05	11.18	2.47
70	10.01	10	10.02	10.01	2.21
80	9.01	9.03	9.02	9.02	1.99
90	8.65	8.19	8.65	8.56	1.89

CPO 40 %

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
28	75.46	75.92	76.25	75.88	16.77

CPO 30 %

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
28	52.26	52.08	52.1	52.15	11.52

CPO 20 %

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
28	39.13	39.12	39.03	39.09	8.64

CPO 10 %

TEMPERATUR (°C)	t1 (s)	t2 (s)	t3 (s)	t rata-rata (s)	VISCOCITY
28	25.72	25.91	25.97	25.87	5.72

LAMPIRAN 4

Data Hasil Kalibrasi Watthour meter

ACTARIS
metering systems

EC type approv.certificate : TXXXXX
Typo : ACE 2000 / A14 ST
Clause : 8.7.2
Standard : Class B
Test : Error Curve

0,5 A 1,5 A 15 A 90 A

No	Date	Serial Number	Value of current	I_{min}	I_{tr}			I_{ref}			I_{max}		
			P.F.	1	1	0.5l	0.8c	1	0.5l	0.8c	1	0.5l	0.8c
			Lower limit	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%	-0.5%
			Upper limit	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
1	15/11/2007	1	Results	-0.03	0.02	0.09	-0.03	0.03	0.01	0.02	0.22	0.14	0.17
5	15/11/2007	2	Results	0.02	0.13	0.03	0.09	0.05	-0.04	0.08	0.21	0.16	0.32

Error Curve