

**Tabel.** Data pengujian viskositas oli MPX2 pertama

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	MPX Temp Kamar	1	3	4,9	28,5	98
			9	10,2	28,5	102
			12	20,9	28,5	104,5
			30	52,8	28,5	105,6
			60	-	-	-
2	MPX Temp $\pm$ 30°C	1	3	3,7	33,6	74
			9	8,5	33,5	85
			12	16,4	33,3	82
			30	41,5	33,2	83
			60	83,6	33,2	83,6
3	MPX Temp $\pm$ 40°C	1	3	2,5	43,6	50
			9	5,7	43,3	57
			12	10,2	43,1	51
			30	25,8	43	51,6
			60	52,6	43	52,6
4	MPX Temp $\pm$ 50°C	1	3	2,3	52,1	46
			9	4,2	52,2	42
			12	7	51,9	35
			30	18,4	51,6	35
			60	37,9	51,5	36,9
5	MPX Temp $\pm$ 60°C	1	3	1,8	60,2	37,9
			9	2,6	60,3	26
			12	5,2	60,2	26
			30	13,4	60,1	26,8
			60	27,8	60,1	27,8

**Tabel.** Data pengujian viskositas oli MPX2 kedua

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	MPX Temp Kamar	1	3	5	29,1	100
			6	10,1	29,3	101
			12	20,5	29,4	102,5
			30	51,6	29,5	103,2
			60	-	-	-
2	MPX Temp ± 30°C	1	3	3,3	34,5	66
			6	8	34,4	80
			12	15,9	34,1	79,5
			30	39,9	33,9	79,9
			60	79,6	33,9	79,6
3	MPX Temp ± 40°C	1	3	2,5	43,7	50
			6	5,9	43,5	59
			12	11	43,3	55
			30	26,3	43	52,6
			60	54,2	43	54,2
4	MPX Temp ± 50°C	1	3	2,5	52,5	50
			6	4,3	52,4	43
			12	7,2	51,5	36
			30	19,3	51	38,6
			60	39,8	51	39,8
5	MPX Temp ± 60°C	1	3	1,9	61,7	36
			6	3,3	61,5	33
			12	4,8	61,2	24
			30	13,2	60,9	26,4
			60	26,8	60,9	26,8

**Tabel.** Data pengujian viskositas oli MPX2 ketiga

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	MPX Temp Kamar	1	3	4,7	29,8	96
			6	9,9	29,7	99
			12	19,9	29,8	99,5
			30	50,1	29,9	102,2
			60	-	-	-
2	MPX Temp ± 30°C	1	3	4,4	33,7	88
			6	7,8	33,7	78
			12	16,2	33,6	81
			30	40,8	33,5	81,6
			60	81,2	33,5	81,2
3	MPX Temp ± 40°C	1	3	2,9	42,6	58
			6	6	42,4	60
			12	11,3	42,2	56,5
			30	28,2	42	56,4
			60	57,8	41,8	57,8
4	MPX Temp ± 50°C	1	3	2,1	53,8	42
			6	3,9	53,6	39
			12	6,8	53,5	34
			30	17,5	53,3	35
			60	34,9	53,3	34,9
5	MPX Temp ± 60°C	1	3	2,1	62,6	42
			6	3,5	62	35
			12	4,5	61,7	22,5
			30	12,8	61,6	25,6
			60	29	61,6	26

**Tabel.** Data pengujian viskositas oli Motul 3100 pertama

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	Motul Temp Kamar	1	3	6,8	29,6	136
			9	14,1	29,6	141
			12	28,9	29,6	144,5
			30	73	29,6	146
			60	-	-	-
2	Motul Temp ± 30°C	1	3	5,4	33,8	108
			9	11,4	33,7	114
			12	23,8	33,6	119
			30	60,8	33,6	121,6
			60	11,9	33,4	119
3	Motul Temp ± 40°C	1	3	3,9	41,5	78
			9	8,6	41,1	86
			12	17,1	41	85,5
			30	42,9	40,9	85,8
			60	38,6	40,9	86
4	Motul Temp ± 50°C	1	3	3,7	53,1	74
			9	6,3	53,1	63
			12	11	53	55
			30	26,6	52,5	53,2
			60	53,8	52,3	53,8
5	Motul Temp ± 60°C	1	3	2,7	61,6	54
			9	4,9	61,2	49
			12	7,6	60,9	38
			30	19,3	60,6	38,6
			60	39,7	60,4	39,7

**Tabel.** Data pengujian viskositas oli Motul 3100 kedua

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	Motul Temp Kamar	1	3	7	29,1	140
			6	14,5	29,1	145
			12	29,9	29,1	149,5
			30	75,7	29,1	151,4
			60	-	-	-
2	Motul Temp ± 30°c	1	3	6,5	31,2	130
			6	13,2	31,2	132
			12	26,7	31,2	133,5
			30	67,4	31,2	134,8
			60	-	-	-
3	Motul Temp ± 40°c	1	3	4	43,7	80
			6	8,3	43,7	83
			12	15,7	43,5	78,5
			30	39	43,3	78
			60	79,7	42,9	79,7
4	Motul Temp ± 50°c	1	3	3,2	53	64
			6	6,1	52,3	61
			12	10,8	51,9	54
			30	27,8	51,6	55,8
			60	57,8	51,4	57,8
5	Motul Temp ± 60°c	1	3	3,6	60,8	72
			6	7,7	60,5	77
			12	12,9	61,3	64,5
			30	32,4	61	64,6
			60	51,9	60,5	51,9

**Tabel.** Data pengujian viskositas oli Motul 3100 ketiga

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	Motul Temp Kamar	1	3	7,4	29,1	148
			6	14,9	29,1	149
			12	30,1	29,1	150,5
			30	75,7	29,1	151,7
			60	-	-	-
2	Motul Temp ± 30°c	1	3	6,6	31,5	132
			6	13	31,5	130
			12	26,6	31,5	133
			30	67,3	31,5	134,6
			60	-	-	-
3	Motul Temp ± 40°c	1	3	3,7	42,7	74
			6	8,1	42,5	81
			12	16,2	42,5	81
			30	40,6	42,3	81,4
			60	83	42	83,1
4	Motul Temp ± 50°c	1	3	3,1	53,8	62
			6	5,6	53,6	56
			12	10,2	53,5	51
			30	25,3	53,1	50,6
			60	53,1	53	53,1
5	Motul Temp ± 60°c	1	3	2,5	62,8	50
			6	4,5	62	45
			12	7,3	61,4	36,5
			30	18,9	61,1	37,8
			60	39	60,8	39,1

**Tabel.** Data pengujian viskositas oli BM1 pertama

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	BM 1 Temp Kamar	1	3	7,7	28,7	154
			9	15,9	28,7	159
			12	32,1	28,7	160,5
			30	80,6	28,7	161,2
			60	-	-	-
2	BM 1 Temp ± 30°C	1	3	5,5	33,9	110
			9	11,4	33,7	114
			12	23,8	33,6	119
			30	60,9	33,5	121,8
			60	-	-	-
3	BM 1 Temp ± 40°C	1	3	4,7	40,9	93
			9	9,3	40,5	94
			12	14,8	43,3	74
			30	37,9	43,1	75,8
			60	77,7	43,1	77,7
4	BM 1 Temp ± 50°C	1	3	2,9	50,7	58
			9	6,4	50,4	64
			12	11,5	50,2	57,5
			30	28,6	50,1	57,2
			60	58,4	50,2	58,4
5	BM 1 Temp ± 60°C	1	3	2,3	61,5	46
			9	4,1	61	41
			12	7,3	60,6	36,5
			30	18	60,6	37,6
			60	38,5	60,4	38,5

**Tabel.** Data pengujian viskositas oli BM1 kedua

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	BM 1 Temp Kamar	1	3	7,4	29,5	148
			6	15,1	29,5	151
			12	30,7	29,5	153,5
			30	77,3	29,5	153,5
			60	-	-	-
2	BM 1 Temp $\pm$ 30°C	1	3	6,1	34,6	122
			6	12,3	34,5	123
			12	24,8	34,5	124
			30	62,4	33,4	124,8
			60	-	-	-
3	BM 1 Temp $\pm$ 40°C	1	3	3,7	43,2	74
			6	8	43,2	80
			12	15,9	43,1	79,5
			30	40,2	43,1	80,4
			60	80,6	42,9	80,6
4	BM 1 Temp $\pm$ 50°C	1	3	2,8	54	56
			6	5,4	53,7	54
			12	10,1	53,4	50,5
			30	26,1	53,2	52,2
			60	53,8	53,2	53,8
5	BM 1 Temp $\pm$ 60°C	1	3	2,4	62,4	48
			6	4,1	62,2	41
			12	7,2	61,9	36
			30	18,2	61,5	37,4
			60	38,1	61,7	38,1



**Tabel.** Data pengujian viskositas oli BM1 ketiga

No	Fluida	Rotor	Speed (Rpm)	Percent (%)	Temperatur (°C)	Viskositas (mPas)
1	BM 1 Temp Kamar	1	3	7,4	29,6	148
			6	15,1	29,6	151
			12	30,7	29,6	153,5
			30	77,2	29,6	154,4
			60	-	-	-
2	BM 1 Temp ± 30°C	1	3	6	33,3	120
			6	12,2	33,2	122
			12	24,8	33,2	124
			30	62,6	33,2	125,2
			60	-	-	-
3	BM 1 Temp ± 40°C	1	3	3,9	42,8	78
			6	8,2	42,6	82
			12	16,4	42,4	82
			30	41,6	42,2	83,4
			60	84,8	42,1	84,8
4	BM 1 Temp ± 50°C	1	3	2,9	51,9	58
			6	5,7	51,5	57
			12	10,9	51,3	54,5
			30	28,1	51,1	54,6
			60	58	51,1	58
5	BM 1 Temp ± 60°C	1	3	2	60	46
			6	3,7	62	39
			12	6,3	62,6	36,7
			30	13,6	62,5	37
			60	38,3	61,4	38,3

**Tabel.** Data pengukuran konduktivitas termal sampel oli MPX2

Nomor Pengujian MPX 2	T1 (°C)	T2 (°C)	Tegangan Heater (Volt)	Arus Heater (A)	Daya, Qe, (Watt)	T1-T2 (°C)	Qi (Watt)	Qc (Watt)	Tebal Spesimen (m)	Luas Permukaan (m2)	K Eksperimen	Temperatur Rata-rata Spesimen (°C)
1	28,7	28,3	36	0,061	2,196	0,4	0,058621	2,137379	0,00034	0,0133	0,13659943	28,5
	30,3	28,6	74	0,124	9,176	1,7	0,249138	8,926862	0,00034	0,0133	0,13423853	29,45
	35,8	30,2	124	0,243	30,132	5,6	0,82069	29,31131	0,00034	0,0133	0,13380566	33
	41,9	32	162	0,317	51,354	9,9	1,450862	49,90314	0,00034	0,0133	0,12886054	36,95
	49,7	33	210	0,375	78,75	16,7	2,447414	76,30259	0,00034	0,0133	0,11680194	41,35
2	27,5	27,1	40	0,055	2,2	0,4	0,058621	2,141379	0,00034	0,0133	0,13685507	27,3
	29,8	28	75	0,129	9,675	1,8	0,263793	9,411207	0,00034	0,0133	0,13365958	28,9
	35,3	30,6	111	0,227	25,197	4,7	0,688793	24,50821	0,00034	0,0133	0,13330332	32,95
	42,1	33,2	152	0,303	46,056	8,9	1,30431	44,75169	0,00034	0,0133	0,12854249	37,65
	50,5	33,4	205	0,362	74,21	17,1	2,506034	71,70397	0,00034	0,0133	0,10719495	41,95
3	29	28,7	33	0,05	1,65	0,3	0,043966	1,606034	0,00034	0,0133	0,13685507	28,85
	30,9	29,4	64	0,128	8,192	1,5	0,219828	7,972172	0,00034	0,0133	0,1358666	30,15
	36,2	31,3	112	0,235	26,32	4,9	0,718103	25,6019	0,00034	0,0133	0,13356828	33,75
	43,2	33,1	163	0,308	50,204	10,1	1,480172	48,72383	0,00034	0,0133	0,12332391	38,15
	50,8	34	204	0,363	74,052	16,8	2,462069	71,58993	0,00034	0,0133	0,10893563	42,4

**Tabel.** Data pengukuran konduktivitas termal sampel oli Motul 3100

Nomor Pengujian Motul 3100	T1 (°C)	T2 (°C)	Tegangan Heater (Volt)	Arus Heater (A)	Daya, Qe, (Watt)	T1-T2 (°C)	Qi (Watt)	Qc (Watt)	Tebal Spesimen (m)	Luas Permukaan (m2)	K Eksperimen	Temperatur Rata-rata Spesimen (°C)
1	26,7	26,5	23	0,052	1,196	0,2	0,02931	1,16669	0,00034	0,0133	0,14912575	26,6
	28,9	27,4	63	0,135	8,505	1,5	0,219828	8,285172	0,00034	0,0133	0,14120093	28,15
	33,4	28,8	112	0,232	25,984	4,6	0,674138	25,30986	0,00034	0,0133	0,14065631	31,1
	39,9	31,1	155	0,305	47,275	8,8	1,289655	45,98534	0,00034	0,0133	0,13358696	35,5
	47,7	33	200	0,36	72	14,7	2,15431	69,84569	0,00034	0,0133	0,12146455	40,35
2	27,1	27	20	0,03	0,6	0,1	0,014655	0,585345	0,00034	0,0133	0,14963702	27,05
	29,2	27,6	65	0,142	9,23	1,6	0,234483	8,995517	0,00034	0,0133	0,14372537	28,4
	33,5	29	116	0,22	25,52	4,5	0,659483	24,86052	0,00034	0,0133	0,14122934	31,25
	40	30,9	160	0,301	48,16	9,1	1,333621	46,82638	0,00034	0,0133	0,13154564	35,45
	48	33,3	204	0,36	73,44	14,7	2,15431	71,28569	0,00034	0,0133	0,12396877	40,65
3	27,5	27,3	22	0,054	1,188	0,2	0,02931	1,15869	0,00034	0,0133	0,14810319	27,4
	29,6	28	70	0,129	9,03	1,6	0,234483	8,795517	0,00034	0,0133	0,14052988	28,8
	34,4	29,6	119	0,227	27,013	4,8	0,703448	26,30955	0,00034	0,0133	0,14011979	32
	40,7	32	158	0,299	47,242	8,7	1,275	45,967	0,00034	0,0133	0,13506853	36,35
	48,4	33,8	200	0,356	71,2	14,6	2,139655	69,06034	0,00034	0,0133	0,1209214	41,1

**Tabel.** Data pengukuran konduktivitas termal sampel oli BM1

Nomor Pengujian BM 1	T1 (°C)	T2 (°C)	Tegangan Heater (Volt)	Arus Heater (A)	Daya, Qe, (Watt)	T1-T2 (°C)	Qi (Watt)	Qc (Watt)	Tebal Spesimen (m)	Luas Permukaan (m2)	K Eksperimen	Temperatur Rata-rata Spesimen (°C)
1	27,7	27,5	21	0,057	1,197	0,2	0,02931	1,16769	0,00034	0,0133	0,149253565	27,6
	29,8	28,1	74	0,135	9,99	1,7	0,249138	9,740862	0,00034	0,0133	0,146479129	28,95
	34,9	29,9	125	0,232	29	5	0,732759	28,26724	0,00034	0,0133	0,144524242	32,4
	41,2	32,1	161	0,305	49,105	9,1	1,333621	47,77138	0,00034	0,0133	0,134200355	36,65
	48,8	33,8	209	0,356	74,404	15	2,198276	72,20572	0,00034	0,0133	0,123057374	41,3
2	27,8	27,6	23	0,052	1,196	0,2	0,02931	1,16669	0,00034	0,0133	0,149125745	27,7
	30,1	28,4	76	0,13	9,88	1,7	0,249138	9,630862	0,00034	0,0133	0,144824994	29,25
	34,4	29,8	119	0,223	26,537	4,6	0,674138	25,86286	0,00034	0,0133	0,143729537	32,1
	40,8	32,1	158	0,298	47,084	8,7	1,275	45,809	0,00034	0,0133	0,134604269	36,45
	49,1	33,9	213	0,359	76,467	15,2	2,227586	74,23941	0,00034	0,0133	0,124858531	41,5
3	27,8	27,6	23	0,051	1,173	0,2	0,02931	1,14369	0,00034	0,0133	0,146185896	27,7
	30,7	29	72	0,137	9,864	1,7	0,249138	9,614862	0,00034	0,0133	0,144584392	29,85
	35,2	30,3	122	0,228	27,816	4,9	0,718103	27,0979	0,00034	0,0133	0,141373098	32,75
	41,7	32,6	161	0,304	48,944	9,1	1,333621	47,61038	0,00034	0,0133	0,13374807	37,15
	49,8	34	210	0,363	76,23	15,8	2,315517	73,91448	0,00034	0,0133	0,11959134	41,9

**Tabel.** Data hasil pengukuran konsumsi bahan bakar

<b>Sampel Oli</b>	<b>Jarak (KM)</b>	<b>Waktu (Menit)</b>	<b>Volume BBM (Liter)</b>
MPX2	4	8.3	0.08
		8.22	0.079
		8.45	0.08
		8.11	0.081
		8.23	0.079
BM1	4	8.17	0.074
		8.55	0.075
		7.57	0.075
		8.05	0.074
		8.26	0.073
Motul 3100	4	8.44	0.078
		8.23	0.076
		8.03	0.077
		8.32	0.077
		8.21	0.076

Grafik 1 Kalibrasi  $Q_i$

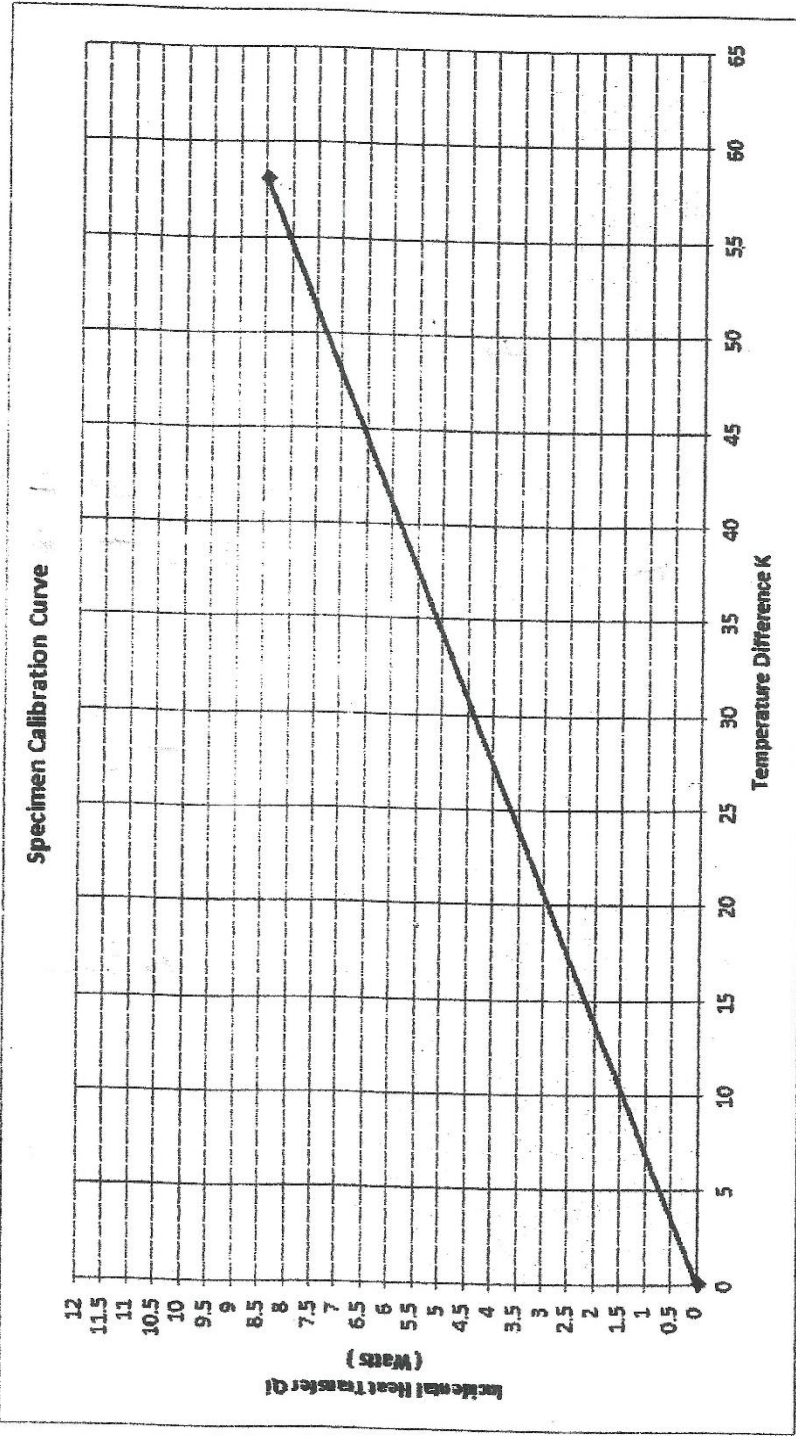


TABLE A-13

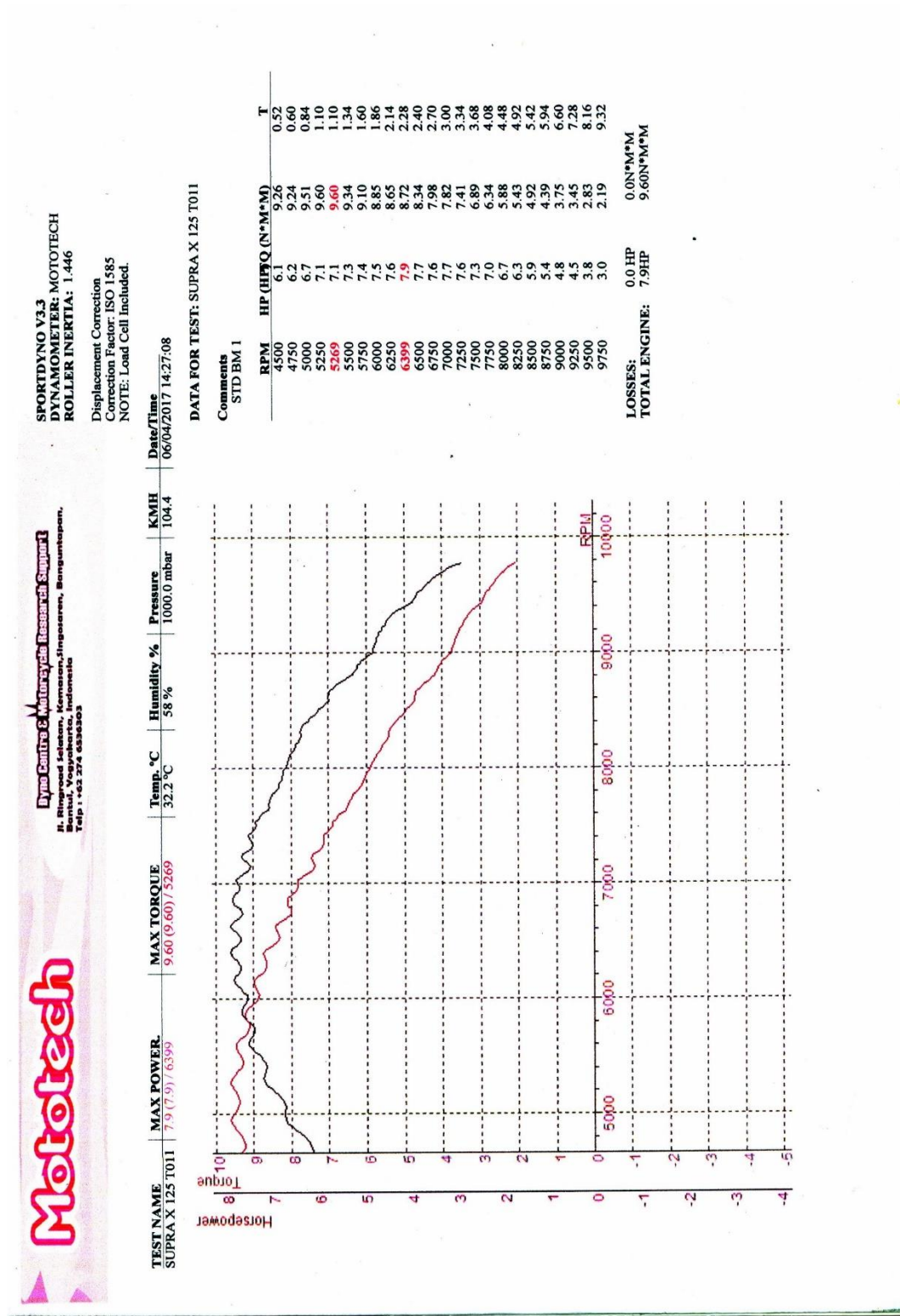
Properties of liquids

Temp. <i>T</i> , °C	Density $\rho$ , kg/m <sup>3</sup>	Specific Heat $c_p$ , J/kg·K	Thermal Conductivity $k$ , W/m·K	Thermal Diffusivity $\alpha$ , m <sup>2</sup> /s	Dynamic Viscosity $\mu$ , kg/m·s	Kinematic Viscosity $\nu$ , m <sup>2</sup> /s	Prandtl Number Pr	Volume Expansion Coeff. $\beta$ , 1/K
<i>Methane (CH<sub>4</sub>)</i>								
-160	420.2	3492	0.1863	$1.270 \times 10^{-7}$	$1.133 \times 10^{-4}$	$2.699 \times 10^{-7}$	2.126	0.00852
-150	405.0	3580	0.1703	$1.174 \times 10^{-7}$	$9.169 \times 10^{-5}$	$2.264 \times 10^{-7}$	1.927	0.00391
-140	388.8	3700	0.1550	$1.077 \times 10^{-7}$	$7.551 \times 10^{-5}$	$1.942 \times 10^{-7}$	1.803	0.00444
-130	371.1	3875	0.1402	$9.749 \times 10^{-8}$	$6.288 \times 10^{-5}$	$1.694 \times 10^{-7}$	1.738	0.00520
-120	351.4	4146	0.1258	$8.634 \times 10^{-8}$	$5.257 \times 10^{-5}$	$1.496 \times 10^{-7}$	1.732	0.00637
-110	328.8	4611	0.1115	$7.356 \times 10^{-8}$	$4.377 \times 10^{-5}$	$1.331 \times 10^{-7}$	1.810	0.00841
-100	301.0	5878	0.0967	$5.761 \times 10^{-8}$	$3.577 \times 10^{-5}$	$1.188 \times 10^{-7}$	2.063	0.01282
-90	261.7	8902	0.0797	$3.423 \times 10^{-8}$	$2.761 \times 10^{-5}$	$1.056 \times 10^{-7}$	3.082	0.02922
<i>Methanol (CH<sub>3</sub>(OH))</i>								
20	788.4	2515	0.1967	$1.002 \times 10^{-7}$	$5.857 \times 10^{-4}$	$7.429 \times 10^{-7}$	7.414	0.00118
30	779.1	2577	0.1980	$9.862 \times 10^{-8}$	$5.088 \times 10^{-4}$	$6.531 \times 10^{-7}$	6.622	0.00120
40	769.6	2644	0.1972	$9.690 \times 10^{-8}$	$4.460 \times 10^{-4}$	$5.795 \times 10^{-7}$	5.980	0.00123
50	760.1	2718	0.1965	$9.509 \times 10^{-8}$	$3.942 \times 10^{-4}$	$5.185 \times 10^{-7}$	5.453	0.00127
60	750.4	2798	0.1957	$9.320 \times 10^{-8}$	$3.510 \times 10^{-4}$	$4.677 \times 10^{-7}$	5.018	0.00132
70	740.4	2885	0.1950	$9.128 \times 10^{-8}$	$3.146 \times 10^{-4}$	$4.250 \times 10^{-7}$	4.655	0.00137
<i>Isobutane (R600a)</i>								
-100	683.8	1881	0.1389	$1.075 \times 10^{-7}$	$9.305 \times 10^{-4}$	$1.360 \times 10^{-6}$	12.65	0.00142
-75	659.3	1970	0.1357	$1.044 \times 10^{-7}$	$5.624 \times 10^{-4}$	$8.591 \times 10^{-7}$	8.167	0.00180
-50	634.3	2069	0.1283	$9.773 \times 10^{-8}$	$3.769 \times 10^{-4}$	$5.942 \times 10^{-7}$	6.079	0.00161
-25	608.2	2180	0.1181	$8.906 \times 10^{-8}$	$2.688 \times 10^{-4}$	$4.420 \times 10^{-7}$	4.963	0.00177
0	580.6	2306	0.1068	$7.974 \times 10^{-8}$	$1.992 \times 10^{-4}$	$3.432 \times 10^{-7}$	4.304	0.00199
25	550.7	2455	0.0956	$7.069 \times 10^{-8}$	$1.510 \times 10^{-4}$	$2.743 \times 10^{-7}$	3.880	0.00232
50	517.3	2640	0.0851	$6.233 \times 10^{-8}$	$1.155 \times 10^{-4}$	$2.233 \times 10^{-7}$	3.582	0.00286
75	478.5	2896	0.0757	$5.460 \times 10^{-8}$	$8.785 \times 10^{-5}$	$1.836 \times 10^{-7}$	3.363	0.00385
100	429.6	3361	0.0669	$4.634 \times 10^{-8}$	$6.483 \times 10^{-5}$	$1.509 \times 10^{-7}$	3.256	0.00628
<i>Glycerin</i>								
0	1276	2262	0.2820	$9.773 \times 10^{-8}$	10.49	$8.219 \times 10^{-3}$	84,101	
5	1273	2288	0.2835	$9.732 \times 10^{-8}$	6.790	$5.287 \times 10^{-3}$	54,327	
10	1270	2320	0.2846	$9.662 \times 10^{-8}$	4.241	$3.339 \times 10^{-3}$	34,561	
15	1267	2354	0.2856	$9.576 \times 10^{-8}$	2.496	$1.970 \times 10^{-3}$	20,570	
20	1264	2386	0.2860	$9.484 \times 10^{-8}$	1.519	$1.201 \times 10^{-3}$	12,671	
25	1261	2416	0.2860	$9.388 \times 10^{-8}$	0.9934	$7.878 \times 10^{-4}$	8,392	
30	1258	2447	0.2860	$9.291 \times 10^{-8}$	0.6582	$5.232 \times 10^{-4}$	5,651	
35	1255	2478	0.2860	$9.196 \times 10^{-8}$	0.4347	$3.464 \times 10^{-4}$	3,767	
40	1252	2513	0.2863	$9.101 \times 10^{-8}$	0.3073	$2.465 \times 10^{-4}$	2,697	
<i>Engine Oil (unused)</i>								
0	899.0	1797	0.1469	$9.097 \times 10^{-8}$	3.814	$4.242 \times 10^{-3}$	46,636	0.00070
20	882.1	1881	0.1450	$8.680 \times 10^{-8}$	0.8374	$9.429 \times 10^{-4}$	10,863	0.00070
40	876.0	1964	0.1444	$8.391 \times 10^{-8}$	0.2177	$2.485 \times 10^{-4}$	2,962	0.00070
60	863.9	2048	0.1404	$7.934 \times 10^{-8}$	0.07399	$8.565 \times 10^{-5}$	1,080	0.00070
80	852.0	2132	0.1380	$7.599 \times 10^{-8}$	0.03232	$3.794 \times 10^{-5}$	499.3	0.00070
100	840.0	2220	0.1367	$7.330 \times 10^{-8}$	0.01718	$2.046 \times 10^{-5}$	279.1	0.00070
120	828.9	2308	0.1347	$7.042 \times 10^{-8}$	0.01029	$1.241 \times 10^{-5}$	176.3	0.00070
140	816.8	2395	0.1330	$6.798 \times 10^{-8}$	0.006558	$8.029 \times 10^{-6}$	118.1	0.00070
150	810.3	2441	0.1327	$6.708 \times 10^{-8}$	0.005344	$6.595 \times 10^{-6}$	98.31	0.00070

Source: Data generated from the EES software developed by S. A. Klein and F. L. Alvarado. Originally based on various sources.



# Grafik Dynotest Daya dan Torsi oli BM 1







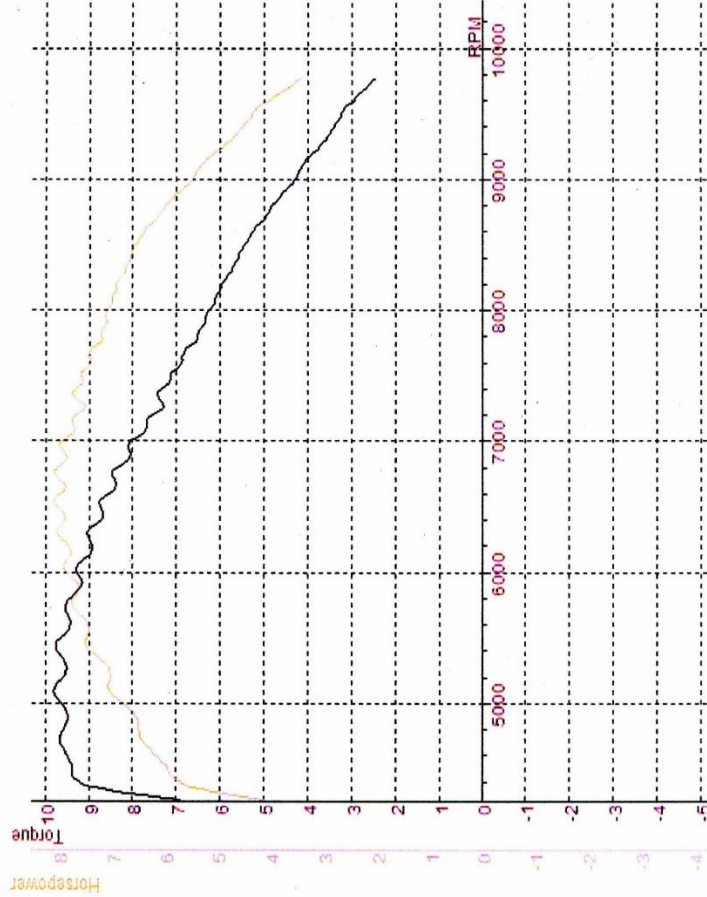
Dyno Centre & Motorcycle Research Support

Jl. Ringroad Selatan, Kawasan Singsoran, Bantorejo, Surabaya  
Bantul, Yogyakarta, Indonesia  
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SPORTDYNO V3.3  
DYNAMOMETER: MOTOTECH  
ROLLER INERTIA: 1.446

Displacement Correction  
Correction Factor: ISO 1585  
NOTE: Load Cell Included.

TEST NAME SUPRA X 125 T012 | MAX POWER 9.81 (9.81) / 5100 | Temp. °C 32.2 °C | Humidity % 58 % | Pressure 1000.0 mbar | KMH 104.5 | Date/Time 06/04/2017 14:27:38



DATA FOR TEST: SUPRA X 125 T012

Comments  
STD:BM 1

RPM	HP (HP) (N*M*M)	T
4250	4.5	7.49
4500	6.0	9.38
4750	6.5	9.64
5000	6.8	9.62
5100	7.0	9.81
5250	7.0	9.50
5500	7.5	9.64
5750	7.7	9.55
6000	7.9	9.30
6250	8.0	9.03
6500	8.1	8.78
6535	8.1	8.78
6750	8.1	8.47
7000	8.0	8.04
7250	7.5	7.31
7500	7.6	7.13
7750	7.2	6.56
8000	7.1	6.24
8250	6.8	5.81
8500	6.5	5.41
8750	6.1	4.89
9000	5.5	4.28
9250	4.9	3.72
9500	4.3	3.23
9750	3.5	2.50

LOSSES: 0.0 HP 0.0 N\*M\*M  
TOTAL ENGINE: 8.1 HP 9.81 N\*M\*M



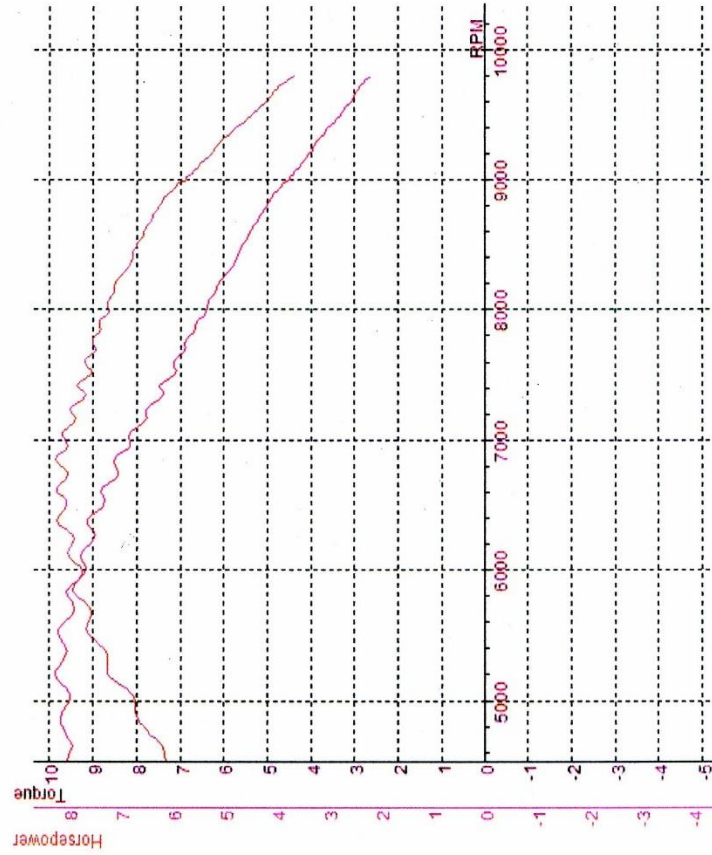
**Dyno Centre & Motorcycle Research Support**  
 H. Binand Satrio, Murnani, Singaperbangsa, Mangrove, Banteng, Yogyakarta, Indonesia  
 Telp : +62 274 8339393

**SPORTDYNO V3.3**  
**DYNAMOMETER: MOTOTECH**  
**ROLLER INERTIA: 1.446**

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell included.

TEST NAME: SUPRA X 125 T013  
 MAX POWER: 4.518 kW (6.11 HP)  
 MAX TORQUE: 9.8617 Nm (7.23 lbf-ft)  
 Temp. °C: 32.2 °C  
 Humidity %: 58 %  
 Pressure: 1000.0 mbar  
 KMH: 104.6  
 Date/Time: 06/04/2017 14:28:06

DATA FOR TEST: SUPRA X 125 T013



Comments  
 STD BM 1

RPM	HP (HP)	HP (N*M*M)	T
4250	6.1	9.58	0.52
4500	6.1	9.55	0.54
4750	6.5	9.66	0.72
5000	6.7	9.54	0.96
5196	7.2	9.86	1.14
5250	7.3	9.81	1.20
5500	7.6	9.79	1.44
5750	7.7	9.48	1.68
6000	7.8	9.16	1.96
6250	7.9	8.95	2.22
6500	8.0	8.73	2.48
6750	8.0	8.42	2.76
6850	8.2	8.52	2.86
7000	8.1	8.15	3.04
7250	7.9	7.73	3.36
7500	7.5	7.11	3.68
7750	7.5	6.87	4.04
8000	7.2	6.39	4.40
8250	7.0	5.97	4.82
8500	6.7	5.55	5.24
8750	6.3	5.09	5.74
9000	5.7	4.49	6.28
9250	5.2	3.95	6.88
9500	4.5	3.33	7.60
9750	3.8	2.76	8.48

LOSSES: 0.0 HP  
 TOTAL ENGINE: 8.2HP  
 0.0N\*M\*M  
 9.86N\*M\*M

# Mototech

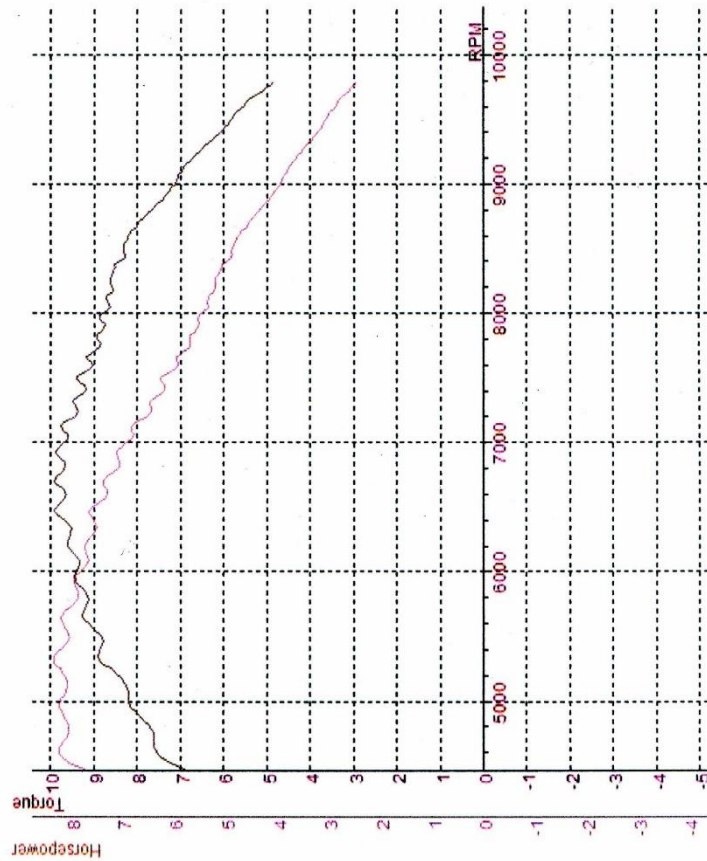
Dyno Centre & Motorcycle Research Support

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Bantul, Yogyakarta, Indonesia  
Telp : +62 274 658363

SPORTDYNO V3.3  
DYNAMOMETER: MOTOTECH  
ROLLER INERTIA: 1.446

Displacement Correction  
Correction Factor: ISO 1585  
NOTE: Load Cell Included.

TEST NAME: SUPRA X 125 T015 | MAX POWER: | MAX TORQUE: | Temp. °C: 32.2 °C | Humidity %: 58 % | Pressure: 1000.0 mbar | KM/H: 104.7 | Date/Time: 06/04/2017 14:28:58



DATA FOR TEST: SUPRA X 125 T015

Comments  
STD EMI 1

RPM	HP (HP) (N·M·M)	T
4250	5.9	9.37
4500	6.0	9.49
4750	6.4	9.57
5000	6.9	9.75
5250	7.2	9.77
5325	7.4	9.92
5500	7.4	9.57
5750	7.7	9.46
6000	7.9	9.30
6250	8.0	9.12
6500	8.2	8.95
6704	8.3	8.79
6750	8.2	8.62
7000	8.1	8.14
7250	7.9	7.67
7500	7.9	7.41
7750	7.4	6.77
8000	7.3	6.46
8250	7.2	6.20
8500	7.0	5.81
8750	6.6	5.30
9000	6.0	4.69
9250	5.5	4.21
9500	4.9	3.63
9750	4.2	3.01

LOSSES: 0.0HP  
TOTAL ENGINE: 8.3HP  
0.0N·M·M  
9.92N·M·M



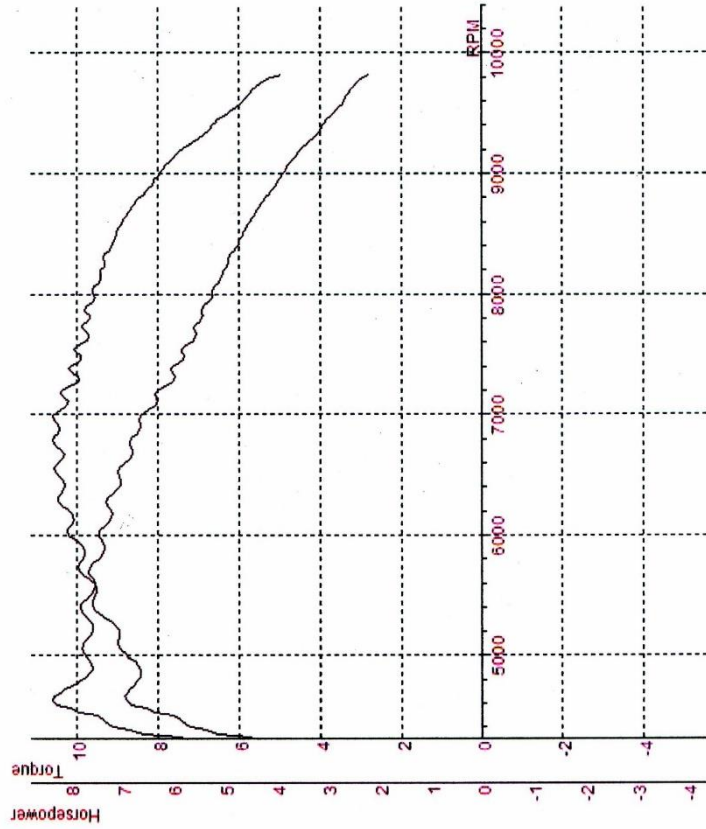
Dyna Centre & Motorcycle Research Support  
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 Bantul, Yogyakarta, Indonesia  
 Telp : +62 274 6336303

SPORTDYNO V3.3  
 DYNAMOMETER: MOTOTECH  
 ROLLER INERTIA: 1.446

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell Included.

TEST NAME | MAX POWER | Temp. °C | Humidity % | Pressure | KMH | Date/Time  
 SUPRA X 125 T016 | 8.3 (8.3) / 6968 | 32.2 °C | 58 % | 1000.0 mbar | 104.9 | 06/04/2017 14:29:24

DATA FOR TEST: SUPRA X 125 T016



Comments  
 STD:BM 1

RPM	HP (HP/Q)	HP (N*M/M)	T
4250	4.8	7.96	0.52
4500	6.2	9.71	0.68
4635	6.9	10.61	0.80
4750	6.7	10.06	0.92
5000	6.9	9.81	1.16
5250	7.1	9.63	1.40
5500	7.5	9.61	1.66
5750	7.8	9.61	1.90
6000	8.0	9.48	2.14
6250	8.2	9.28	2.40
6500	8.3	9.00	2.68
6750	8.3	8.72	2.94
6968	8.3	8.47	3.18
7000	8.3	8.32	3.24
7250	7.9	7.67	3.54
7500	7.8	7.37	3.84
7750	7.7	7.01	4.20
8000	7.6	6.67	4.54
8250	7.3	6.26	4.94
8500	7.1	5.89	5.34
8750	6.7	5.43	5.80
9000	6.3	4.90	6.28
9250	5.7	4.32	6.84
9500	4.9	3.66	7.50
9750	4.3	3.08	8.28

LOSSES: 0.0 HP  
 TOTAL ENGINE: 8.3 HP  
 0.0 N\*M\*M  
 10.61 N\*M\*M





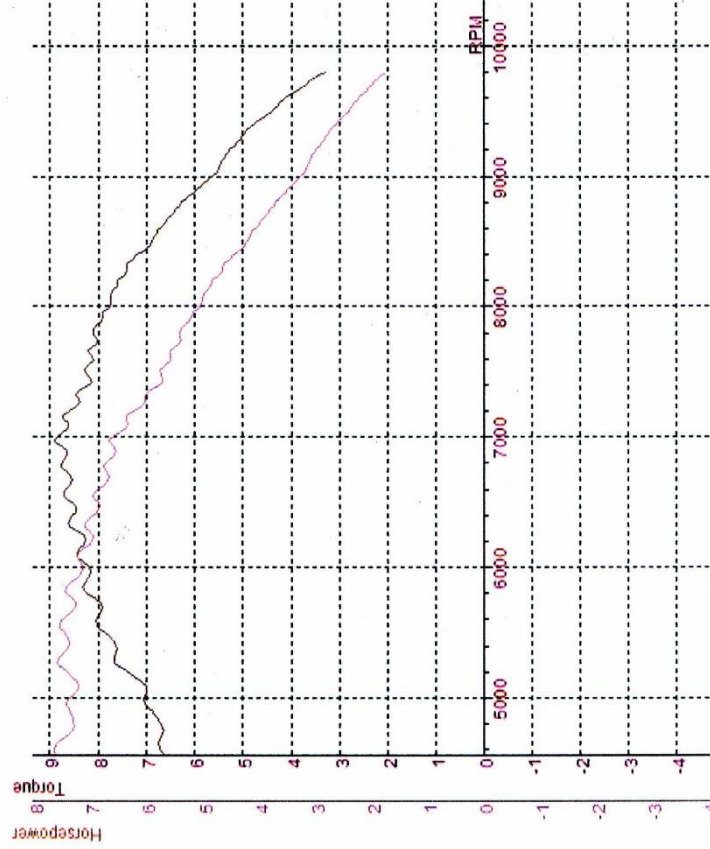


**Dyna Centre & Motoryada Research Support**  
 11, Singapore Science, Kemuning, Singapore, Bukitgamban,  
 11, Singapore  
 Tel: 1-63 274 8383

**SPORTDYN V3.3**  
**DYNAMOMETER: MOTOTECH**  
**ROLLER INERTIA: 1.446**

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell Included.

TEST NAME: SUPRA X 125 T007 | MAX POWER: 7.6HP | MAX TORQUE: 7.6NM | Temp. °C: 32.2 | Humidity %: 50 | Pressure: 1000.0 mbar | KMH: 104.4 | Date/Time: 06/04/2017 14:13:36



DATA FOR TEST: SUPRA X 125 T007

Comments  
 STD MOTUL

RPM	HP (HP)	HP (N*M*M)	T
4250	5.7	8.89	0.52
4500	5.8	8.90	0.54
4592	5.7	8.90	0.54
4750	5.7	8.52	0.72
5000	6.0	8.55	1.00
5250	6.5	8.83	1.26
5500	6.8	8.71	1.52
5750	6.9	8.54	1.80
6000	7.1	8.33	2.08
6250	7.2	8.12	2.36
6500	7.4	8.04	2.66
6750	7.5	7.87	2.96
6974	7.6	7.76	3.22
7000	7.6	7.68	3.26
7250	7.2	7.01	3.60
7500	7.1	6.71	3.96
7750	6.9	6.30	4.32
8000	6.6	5.86	4.72
8250	6.4	5.46	5.16
8500	5.9	4.91	5.66
8750	5.5	4.43	6.18
9000	4.8	3.79	6.82
9250	4.4	3.36	7.52
9500	3.7	2.77	8.36
9750	3.0	2.20	9.42

LOSSES: 0.0N\*M\*M  
 TOTAL ENGINE: 7.6HP  
 8.90N\*M\*M

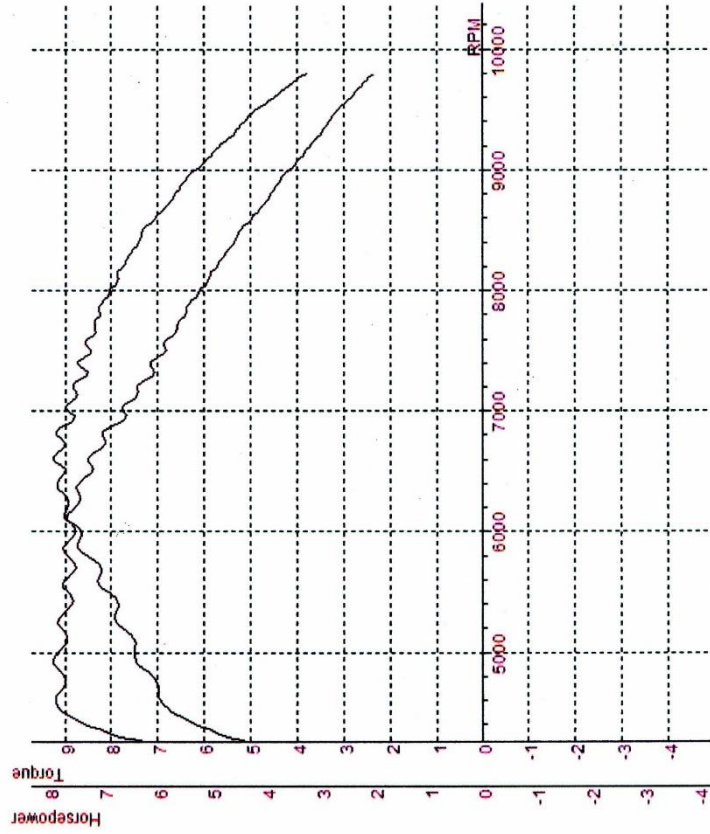


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SPORTDYNO V3.3  
 DYNAMOMETER: MOTOTECH  
 ROLLER INERTIA: 1.446

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell Included.

TEST NAME | MAX POWER | MAX TORQUE | Temp. °C | Humidity % | Pressure | KMH | Date/Time  
 SUPRA X 125 T008 | 7.9 (7.9) / 6622 | 9.25 (9.25) / 4927 | 32.2 °C | 50 % | 1000.0 mbar | 104.4 | 06/04/2017 14:14:10



DATA FOR TEST: SUPRA X 125 T008

Comments  
 STD MOTUL

RPM	HP (HP)Q (N*M*M)	T
4250	4.6	7.59
4500	5.8	9.08
4750	6.0	8.98
4927	6.4	9.25
5000	6.4	9.10
5250	6.8	9.16
5500	6.9	8.95
5750	7.2	8.84
6000	7.4	8.77
6250	7.7	8.68
6500	7.7	8.40
6622	7.9	8.49
6750	7.8	8.12
7000	7.7	7.75
7250	7.5	7.29
7500	7.2	6.82
7750	7.1	6.50
8000	6.9	6.10
8250	6.6	5.61
8500	6.3	5.19
8750	5.7	4.64
9000	5.3	4.13
9250	4.7	3.62
9500	4.2	3.12
9750	3.4	2.49

LOSSES: 0.0 HP 0.0 N\*M\*M  
 TOTAL ENGINE: 7.9 HP 9.25 N\*M\*M



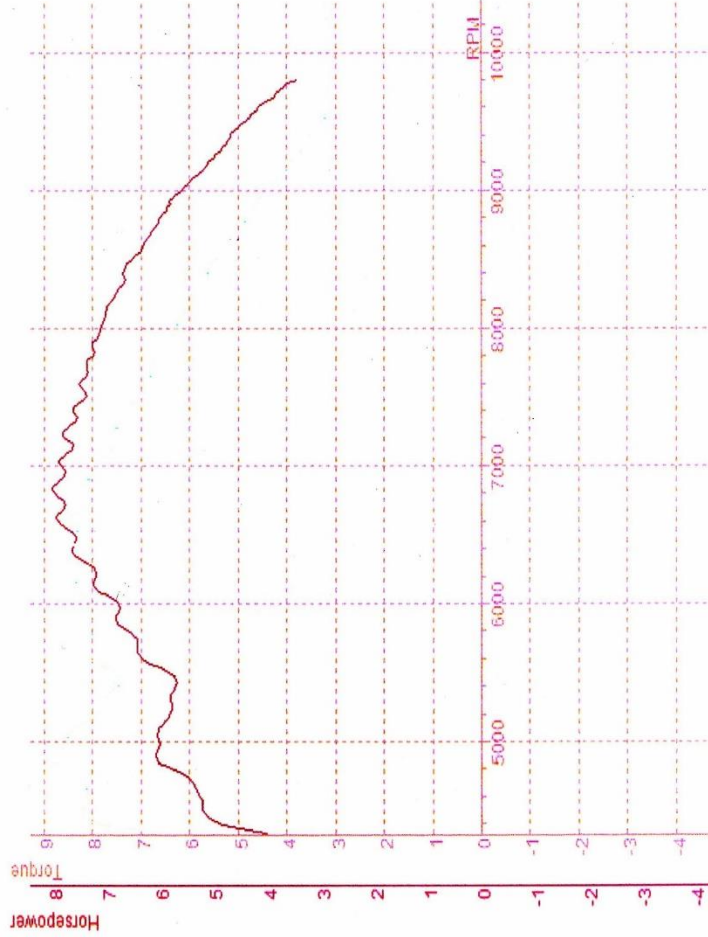
**Dyno Centre & Motorcycle Research Support**  
 Jl. Raya Jatiwarna, Karanganyar, Sukoharjo, Semarang, Indonesia  
 Telp : +62 274 833303

**SPORTDYNO V3.3**  
**DYNAMOMETER: MOTOTECH**  
**ROLLER INERTIA: 1.446**

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell included.

TEST NAME: SUPRA X 125 T009 | MAX POWER: 8.0 (8.0)/6831 | MAX TORQUE: | Temp. °C: 32.2 °C | Humidity %: 50 % | Pressure: 1000.0 mbar | KMH: 104.4

Date/Time: 06/04/2017 14:14:46  
 DATA FOR TEST: SUPRA X 125 T009



Comments  
 STD MOTUL

RPM	HP (HP@Q)	(N*M*M)	T
4250	4.3	7.00	0.52
4500	5.2	8.19	0.72
4750	5.6	8.29	0.98
4873	6.1	8.84	1.10
5000	6.0	8.52	1.26
5250	5.8	7.79	1.56
5500	5.9	7.57	1.86
5750	6.5	7.97	2.14
6000	6.8	8.03	2.44
6250	7.2	8.19	2.70
6500	7.6	8.29	2.98
6750	7.8	8.19	3.26
6831	8.0	8.31	3.36
7000	7.9	7.97	3.58
7250	7.8	7.61	3.88
7500	7.4	6.94	4.22
7750	7.1	6.29	4.56
8000	6.8	5.85	5.36
8250	6.5	5.37	5.84
8500	6.1	4.88	6.30
8750	5.6	4.40	6.86
9000	4.9	3.77	7.48
9250	4.4	3.25	8.20
9500	3.7	2.67	9.14

LOSSES: 0.0 HP  
 TOTAL ENGINE: 8.0HP  
 0.0N\*M\*M  
 8.84N\*M\*M



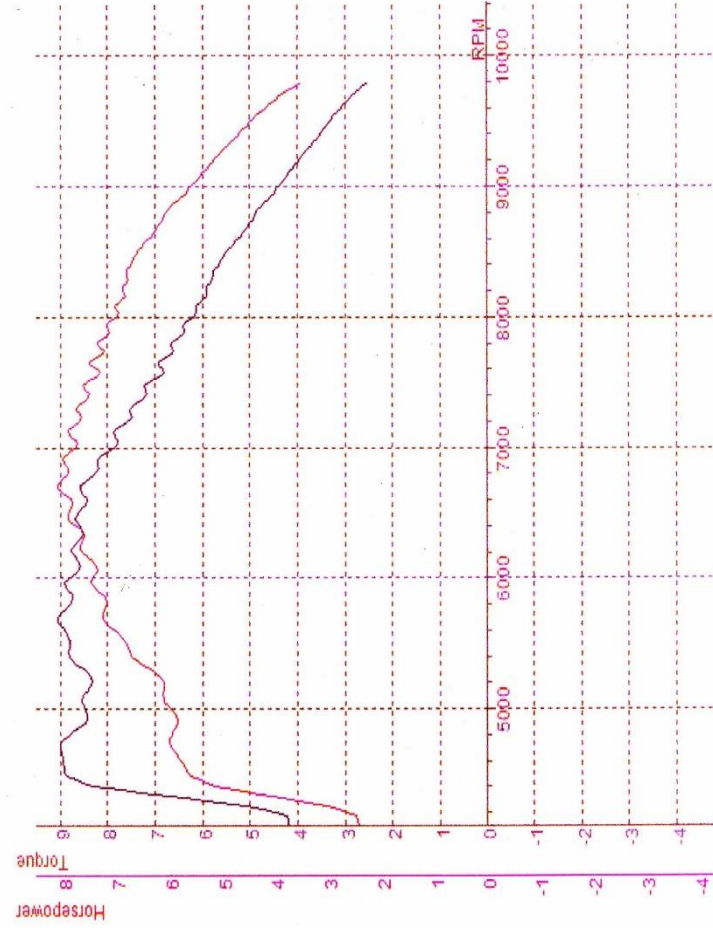


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Telp 1 +62 274 883833

SPORTDYNO V3.3  
DYNAMOMETER: MOTOTECH  
ROLLER INERTIA: 1.446

Displacement Correction  
Correction Factor: ISO 1585  
NOTE: Load Cell Included.

TEST NAME | MAX POWER | MAX TORQUE | Temp. °C | Humidity % | Pressure | KMH | Date/Time  
SUPRAX 125 T010 | 8.1 (8.1) / 6710 | 9.05 (9.05) / 5683 | 32.2 °C | 50 % | 1000.0 mbar | 104.5 | 06/04/2017 14:15:28



DATA FOR TEST: SUPRA X 125 T010

Comments  
STD MOTUL

RPM	HP (HP)Q (N*M*M)	T
4250	3.0	5.06
4500	5.6	8.90
4750	6.0	8.91
5000	6.0	8.47
5250	6.2	8.38
5500	6.8	8.78
5683	7.2	9.05
5750	7.2	8.90
6000	7.4	8.74
6250	7.7	8.70
6500	7.9	8.59
6710	8.1	8.56
6750	8.0	8.38
7000	7.8	7.85
7250	7.7	7.50
7500	7.5	7.08
7750	7.3	6.62
8000	7.0	6.15
8250	6.8	5.82
8500	6.6	5.45
8750	6.1	4.94
9000	5.6	4.36
9250	5.1	3.85
9500	4.5	3.30
9750	3.7	2.65

LOSSES: 0.0N\*M\*M  
TOTAL ENGINE: 8.1HP  
0.0N\*M\*M  
9.05N\*M\*M

# Grafik Dynotest Daya dan Torsi Oli MPX 2



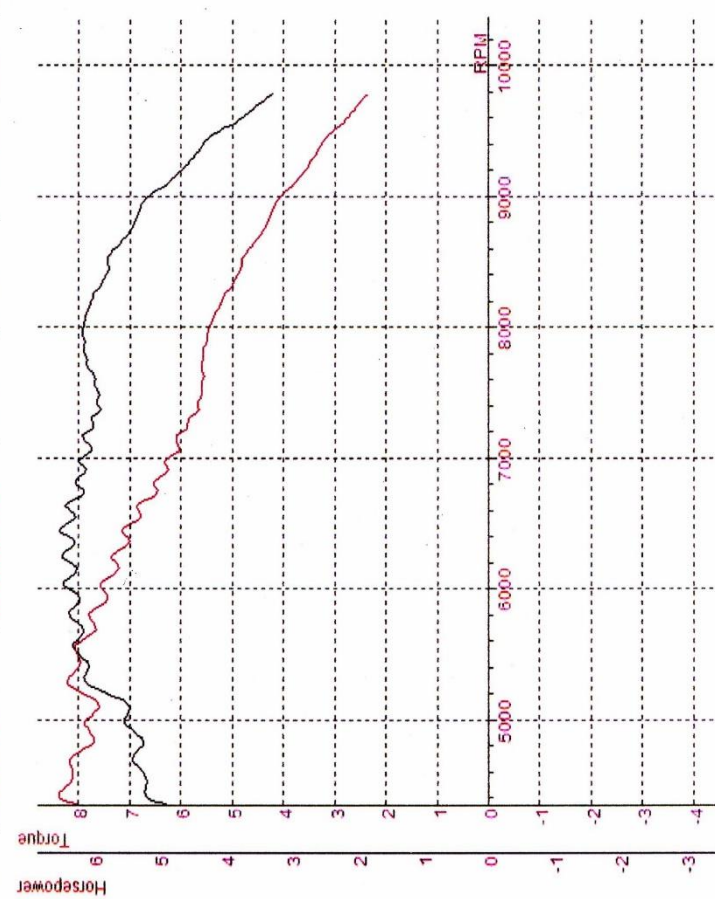
Dyno Centre & Motorcycle Research Support  
 Jl. Raya Cendekia No. 100, Cendekia, Tangerang, Banten 15132  
 Bandung, Yogyakarta, Indragiri, Indragiri, Indragiri  
 Telp : +62 374 838303

SPORTDYNO V3.3  
 DYNAMOMETER: MOTOTECH  
 ROLLER INERTIA: 1.446

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell Included.

TEST NAME | MAX POWER | MAX TORQUE | Temp. °C | Humidity % | Pressure | KM/H | Date/Time  
 SUPRA X 127 | 6.3 (6.3) / 6457 | 8.38 (8.38) / 4420 | 32.2 °C | 53 % | 1000.0 mbar | 104.1 | 06/04/2017 14:01:48

DATA FOR TEST: SUPRA X 127



Comments  
 STD MPX 2

RPM	HP (HP) (N*M*M)	T
4250	5.0	8.20
4420	5.2	8.38
4500	5.2	8.18
4750	5.3	7.97
5000	5.5	7.84
5250	6.0	8.13
5500	6.3	8.05
5750	6.3	7.75
6000	6.4	7.58
6250	6.5	7.34
6457	6.5	7.15
6500	6.4	6.91
6750	6.2	6.46
7000	6.2	6.27
7250	6.0	5.86
7500	5.9	5.59
7750	6.1	5.57
8000	6.2	5.44
8250	6.0	5.15
8500	5.8	4.81
8750	5.4	4.38
9000	5.2	4.07
9250	4.6	3.48
9500	4.0	3.00
9750	3.4	2.43

LOSSES: 0.0 N\*M\*M  
 TOTAL ENGINE: 6.5HP  
 0.0 N\*M\*M  
 8.38 N\*M\*M

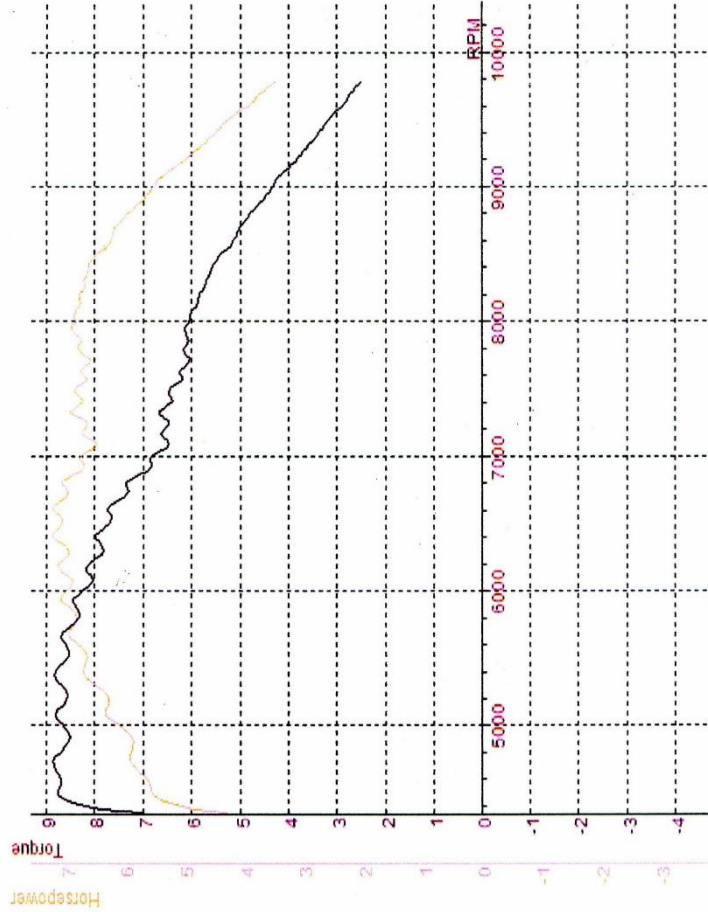


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**SPORTDYNO V3.3**  
**DYNAMOMETER: MOTOTECH**  
**ROLLER INERTIA: 1.446**

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell Included.

TEST NAME: SUPRA X 128 | MAX POWER: 11.011 | MAX TORQUE: 8.87 (8.87) / 4733 | Temp. °C: 32.2 °C | Humidity %: 53 % | Pressure: 1000.0 mbar | KM/H: 104.2 | Date/Time: 06/04/2017 14:02:19



DATA FOR TEST: SUPRA X 128

Comments  
 STD MPX 2

RPM	HP (HP) (N*M*M)	T
4250	4.6	7.47
4500	5.6	8.75
4733	5.9	8.87
4750	5.9	8.81
5000	6.1	8.65
5250	6.4	8.59
5500	6.6	8.55
5750	6.9	8.45
6000	6.9	8.18
6250	7.0	7.91
6500	7.1	7.68
6618	7.2	7.72
6750	7.0	7.32
7000	6.7	6.77
7250	6.6	6.48
7500	6.8	6.42
7750	6.7	6.10
8000	6.8	6.03
8250	6.7	5.72
8500	6.5	5.37
8750	6.1	4.88
9000	5.5	4.31
9250	4.8	3.69
9500	4.3	3.17
9750	3.5	2.55

LOSSES: 0.0 HP  
 TOTAL ENGINE: 7.2HP  
 0.0N\*M\*M  
 8.87N\*M\*M





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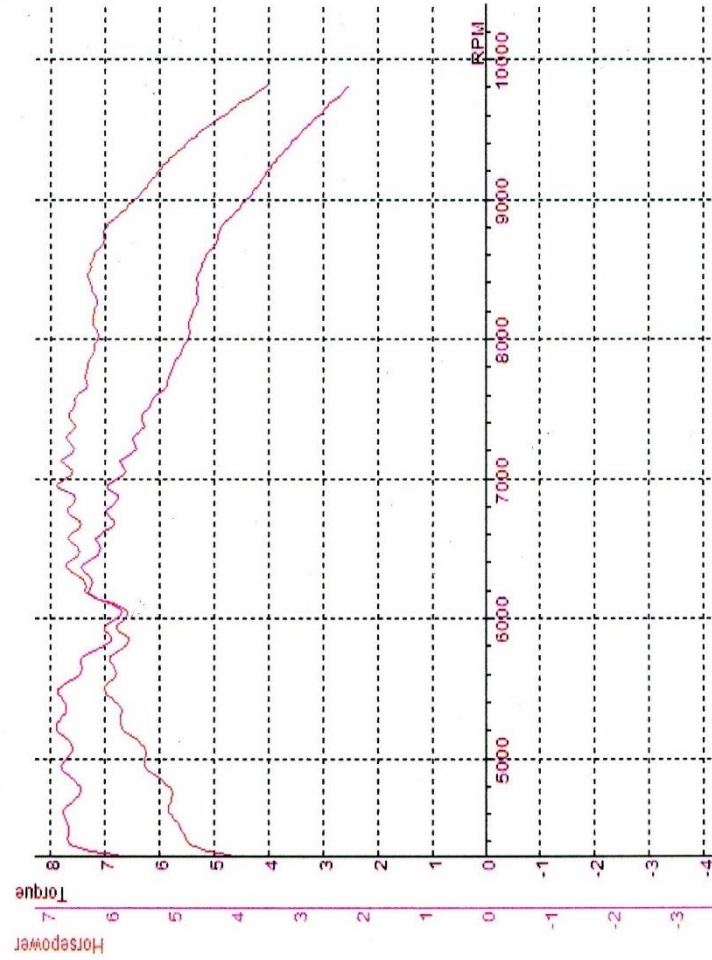
SPORTDYNO V3.3  
 DYNAMOMETER: MOTOTECH  
 ROLLER INERTIA: 1.446

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell Included.

TEST NAME SUPRA X 129  
 MAX POWER 7.89 (7.89) / 5227  
 Temp. °C 32.2 °C  
 Humidity % 53 %  
 Pressure 1000.0 mbar  
 KMH 104.3  
 Date/Time 06/04/2017 14:02:51

DATA FOR TEST: SUPRA X 129

Comments  
 STD MPX 2



LOSSES: 0.0 HP  
 TOTAL ENGINE: 6.8 HP  
 0.0N\*M\*M  
 7.89N\*M\*M

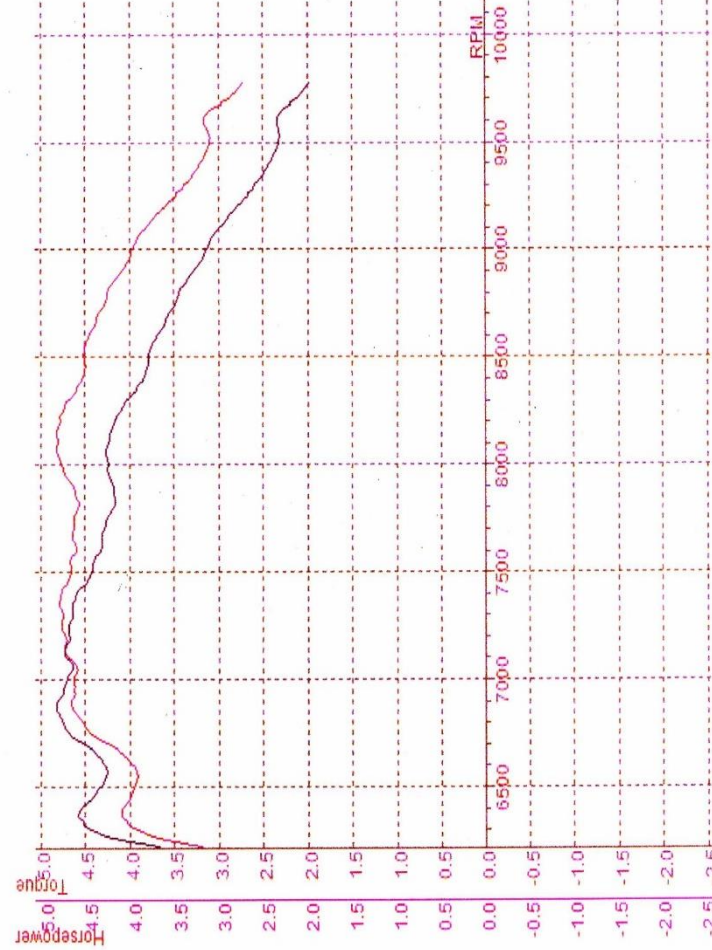


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**SPORTDYNO V3.3**  
**DYNAMOMETER: MOTOTECH**  
**ROLLER INERTIA: 1.446**

Displacement Correction  
 Correction Factor: ISO 1585  
 NOTE: Load Cell Included.

TEST NAME | MAX POWER | MAX TORQUE | Temp. °C | Humidity % | Pressure | KM/H | Date/Time  
 SUPRA X 126 | 4.9 (4.9) / 8135 | 4.82 (4.82) / 6871 | 32.2 | 53 % | 1000.0 mbar | 104.1 | 06/04/2017 14:01:06



DATA FOR TEST: SUPRA X 126

Comments  
 STD MPX 2

RPM	HP (HP)Q (N*M*M)	T
6250	3.6	4.11
6500	4.0	4.32
6750	4.5	4.69
6871	4.7	4.82
7000	4.7	4.71
7250	4.8	4.69
7500	4.7	4.42
7750	4.7	4.25
8000	4.8	4.24
8135	4.9	4.22
8250	4.8	4.10
8500	4.6	3.78
8750	4.3	3.47
9000	4.0	3.14
9250	3.5	2.67
9500	3.1	2.32
9750	2.8	2.02

LOSSES: 0.0 HP  
 TOTAL ENGINE: 4.9HP  
 0.0N\*M\*M  
 4.82N\*M\*M



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SPORTDYNO V3.3  
DYNAMOMETER: MOTOTECH  
ROLLER INERTIA: 1.446

Displacement Correction  
Correction Factor: ISO 1585  
NOTE: Load Cell Included.

TEST NAME | MAX POWER | MAX TORQUE | Temp. °C | Humidity % | Pressure | KMH | Date/Time  
SUPRA X 125 | 5.3 (3.3) / 6398 | | 32.2 °C | 53 % | 1000.0 mbar | 104.0 | 06/04/2017 14:00:29

DATA FOR TEST: SUPRA X 125

Comments  
STD MPX 2

RPM	HP (HP)*M	HP (N*M)*M	T
6250	5.2	5.79	0.52
6363	5.3	5.88	0.60
6398	5.3	5.86	0.66
6500	5.0	5.46	0.86
6750	4.6	4.86	1.34
7000	4.3	4.35	1.90
7250	4.2	4.07	2.46
7500	4.2	3.99	3.06
7750	4.3	3.96	3.62
8000	4.5	3.98	4.20
8250	4.5	3.81	4.84
8500	4.2	3.48	5.50
8750	3.9	3.12	6.24
9000	3.8	2.99	7.04
9250	3.6	2.71	7.94
9500	3.0	2.23	9.00
9750	2.3	1.67	10.46

LOSSES: 0.0 HP  
TOTAL ENGINE: 5.3 HP  
0.0N\*M\*M  
5.88N\*M\*M

