

Lampiran 1 Hasil Pengujian Tarik Formula 1

ESSPHYSIK Laborgeräteges.m.b.H.

Test Certificate

Plastics Tensile Test

Order No.....J1070466
 Teststandard.....ASTM D638
 Tester.....abd

Material.....PP+C+PVDF IV
 Tested on.....2008-11-24
 Kondisi Uji.....22.1oC , RH 61.0 %

Testing machine.....AGS-G
 Pretension.....0.1 N
 Gripped length.....65 mm
 Test speed 1.....0 % → 5 mm/min

Directory.....J1080466pttePP C pvdF
 Parameterset.....ASTM D 1621

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width
 E.....E-Modulus

"M.....Tensile strength
 "B.....Strain at Break
 Comment.....Comment

Test No	BNo	a mm	b mm	E GPa	"M MPa	"B %	Comment
18	PP C pvdF IV-1	2.100	6.490	1.923	5.778	0.400	
19	PP C pvdF IV-2	2.190	6.850	2.650	9.796	0.441	
20	PP C pvdF IV-3	2.150	6.510	2.794	11.03	0.537	
21	PP C pvdF IV-4	1.890	6.650	2.417	10.18	0.612	
Mean:		2.083	6.625	2.446	9.196	0.497	
Minimum:		1.890	6.490	1.923	5.778	0.400	
Maximum:		2.190	6.850	2.794	11.03	0.612	
Std.dev.:		0.134	0.166	0.382	2.336	0.096	
W(0.95) %:		10.20	3.987	24.83	40.42	30.55	
Values:		4	4	4	4	4	

Lampiran 2 Hasil Pengujian Tarik Formula 2

MESSPHYSIK Laborgerätesges.m.b.H.

Test Certificate

Plastics Tensile Test

Order No.....J1070466
 Teststandard.....ASTM D638
 Tester.....abd

Material.....PP+C+PVDF I
 Tested on.....2008-11-24
 Kondisi Uji.....22.1oC , RH 61.0 %

Testing machine.....AGS-G
 Pretension.....0:1 N
 Gripped length.....65 mm
 Test speed 1.....0 % -> 5 mm/min

Directory.....J1080466pptePP C pvdf
 Parameterset.....ASTM D 1621

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width
 E.....E-Modulus

"M.....Tensile strength
 "B.....Strain at Break
 Comment.....Comment

Test No	BNo	a mm	b mm	E GPa	"M MPa	"B %	Comment
7	PP C pvdf I-1	1.740	6.030	2.020	15.25	1.876	
8	PP C pvdf I-2	1.830	6.130	1.726	13.12	1.656	
10	PP C pvdf I-4	1.750	6.050	1.897	14.74	1.722	
11	PP C pvdf I-5	1.760	6.110	1.742	12.84	1.692	
12	PP C pvdf I-6	1.910	6.370	1.827	14.39	1.688	
Mean:		1.798	6.138	1.842	14.07	1.727	
Minimum:		1.740	6.030	1.726	12.84	1.656	
Maximum:		1.910	6.370	2.020	15.25	1.876	
Std.dev.:		0.072	0.136	0.121	1.044	0.087	
W(0.95) %:		4.965	2.753	8.141	9.212	6.228	
Values:		5	5	5	5	5	

Lampiran 3 Hasil Pengujian Tarik Formula 3

LSSPHYSIK Laborgerätesg.m.b.H.

Test Certificate

Plastics Tensile Test

Order No.....J1070466 Material.....PP+C+PVDF
 Teststandard.....ASTM D638 Tested on.....2008-11-24
 Tester.....abd Kondisi Uji.....22.1oC , RH 61.0 %

Testing machine.....AGS-G
 Pretension.....0.1 N
 Gripped length.....65 mm
 Test speed 1.....0 % -> 5 mm/min

Directory.....J1080466pptePP C pvd
 Parameterset.....ASTM D 1621

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width
 E.....E-Modulus

"M.....Tensile strength
 "B.....Strain at Break
 Comment.....Comment

Test No	BNo	a mm	b mm	E GPa	"M MPa	"B %	Comment
1	PP C pvd II-1	1.690	6.090	1.802	13.05	1.479	
2	PP C pvd II-2	1.730	6.080	2.157	16.40	1.602	
3	PP C pvd II-3	1.790	6.120	2.012	15.52	1.574	
4	PP C pvd II-4	1.790	6.110	1.687	14.06	1.517	
5	PP C pvd II-5	1.670	6.090	1.873	15.61	1.967	
Mean:		1.734	6.098	1.906	14.93	1.628	
Minimum:		1.670	6.080	1.687	13.05	1.479	
Maximum:		1.790	6.120	2.157	16.40	1.967	
Std.dev.:		0.055	0.016	0.183	1.347	0.196	
W(0.95) %:		3.973	0.335	11.92	11.21	14.92	
Values:		5	5	5	5	5	

Lampiran 4 Hasil Pengujian Tarik Formula 4

LSPHYSIK Laborgeräteges.m.b.H.

Test Certificate

Plastics Tensile Test

Order No.....J1070466
 Teststandard.....ASTM D638
 Tester.....abd

Material.....PP+C+PVDF III
 Tested on.....2008-11-24
 Kondisi Uji.....22.1oC , RH 61.0 %

Testing machine.....AGS-G
 Pretension.....0.1 N
 Gripped length.....65 mm
 Test speed 1.....0 % -> 5 mm/min

Directory.....J1080466pttePP C pvdF
 Parameterset.....ASTM D 1621

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width
 E.....E-Modulus

"M.....Tensile strength
 "B.....Strain at Break
 Comment.....Comment

Test No	BNo	a mm	b mm	E GPa	"M MPa	"B %	Comment
13	PP C pvdF III-1	1.920	6.530	2.473	9.336	0.490	
14	PP C pvdF III-2	1.910	6.420	1.844	6.122	0.517	
15	PP C pvdF III-3	1.820	6.330	2.654	9.735	0.474	
16	PP C pvdF III-4	1.940	6.120	n.a.	6.304	0.243	
17	PP C pvdF III-5	1.860	6.450	2.478	6.356	0.426	
Mean:		1.890	6.370	2.362	7.571	0.430	
Minimum:		1.820	6.120	1.844	6.122	0.243	
Maximum:		1.940	6.530	2.654	9.735	0.517	
Std.dev.:		0.049	0.157	0.356	1.801	0.110	
W(0.95) %:		3.218	3.060	23.95	29.54	31.66	
Values:		5	5	4	5	5	

Lampiran 5 Hasil Pengujian Tarik PP Murni

Test Certificate**Plastics Tensile Test**

Order No.....J1080466
 Teststandard.....ASTM D638typeIV
 Tester.....abd

Material.....PP
 Tested on.....2008-12-10
 Kondisi Uji.....24.1oC , RH 56%

Testing machine.....AGS-G
 Pretension.....0.01 N
 Gripped length.....65 mm
 Test speed 1.....0 % -> 5 mm/min

Directory.....J1080466ptePP C pvdf
 Parameterset.....ASTM D638 IV

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width
 E.....E-Modulus
 "M.....Tensile strength

"Y.....Yield stress
 "Y.....Yield strain
 "B.....Strain at Break
 Comment.....Comment

Test No	BNo	a mm	b mm	E GPa	"M MPa	"Y MPa	"Y %	"B %	Comment
34	PP - 1	3.090	5.940	0.767	23.44	23.44	7.680	568.1	
91	PP-3	2.900	5.800	0.825	25.16	25.16	7.735	476.9	
92	PP-4	2.860	5.800	0.862	25.67	25.67	7.246	587.8	
93	PP-5	2.870	5.800	0.837	26.57	25.71	7.476	697.3	
Mean:		2.930	5.835	0.823	25.21	24.99	7.534	582.5	
Minimum:		2.860	5.800	0.767	23.44	23.44	7.246	476.9	
Maximum:		3.090	5.940	0.862	26.57	25.71	7.735	697.3	
Std.dev.:		0.108	0.070	0.040	1.316	1.066	0.222	90.49	
W(0.95) %:		5.865	1.909	7.781	8.306	6.788	4.691	24.72	
Values:		4	4	4	4	4	4	4	

Lampiran 6 Hasil Pengujian Kelenturan Formula 1

MESSPHYSIK Laborgerätesges.m.b.H.

Test Certificate

Flexural Test

Order No.....J1080466
 Test Standard.....ASTM D790
 Tester.....abd

Material.....PP C pvdf I
 Tested on.....2008-11-24
 Kondisi Uji.....22.10C,RH61%

Testing machine.....AGS-G
 Test speed 1.....0 % -> 1.644 mm/min

Directory.....J1080466ftPP C pvdf
 Parameterset.....astm d790

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width

Ls.....Support span
 Ef.....E-Modulus
 "fM.....Flexural strength

Test No	BNo	a mm	b mm	Ls mm	Ef GPa	"fM MPa
1	PP C pvdf I-1	3.700	11.87	59.20	2.888	28.84
2	PP C pvdf I-2	3.730	12.56	59.68	2.059	28.56
3	PP C pvdf I-3	3.700	11.78	59.20	2.273	30.84
4	PP C pvdf I-4	3.760	11.77	60.16	2.775	25.90
6	PP C pvdf I-6	3.850	12.04	61.60	3.139	29.21
Mean:		3.748	12.00	59.97	2.627	28.67
Minimum:		3.700	11.77	59.20	2.059	25.90
Maximum:		3.850	12.56	61.60	3.139	30.84
Std.dev.:		0.062	0.329	0.995	0.447	1.783
W(0.95) %:		2.061	3.404	2.061	21.14	7.720
Values:		5	5	5	5	5

Lampiran 7 Hasil Pengujian Kelenturan Formula 2

MESSPHYSIK Laborgeräteges.m.b.H.

Test Certificate

Flexural Test

Order No.....J1080466
 Test Standard.....ASTM D790
 Tester.....abd

Material.....PP C pvdf II
 Tested on.....2008-11-24
 Kondisi Uji.....22.1oC,RH61%

Testing machine.....AGS-G
 Test speed 1.....0 % -> 1.593 mm/min

Directory.....J1080466ftPP C pvdf
 Parameterset.....astm d790

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width

Ls.....Support span
 Ef.....E-Modulus
 "fM.....Flexural strength

Test No	BNo	a mm	b mm	Ls mm	Ef GPa	"fM MPa
7	PP C pvdf II-1	3.790	12.25	60.64	2.792	30.14
8	PP C pvdf II-2	3.740	12.00	59.84	2.255	28.98
9	PP C pvdf II-3	3.760	12.51	60.16	2.307	27.51
10	PP C pvdf II-4	3.730	12.18	59.68	2.309	31.30
11	PP C pvdf II-5	3.730	12.22	59.68	3.052	30.53
Mean:		3.750	12.23	60.00	2.543	29.69
Minimum:		3.730	12.00	59.68	2.255	27.51
Maximum:		3.790	12.51	60.64	3.052	31.30
Std.dev.:		0.025	0.183	0.408	0.359	1.480
W(0.95) %:		0.844	1.860	0.844	17.51	6.186
Values:		5	5	5	5	5

Lampiran 8 Hasil Pengujian Kelenturan Formula 3

MESSPHYSIK Laborgerätes.m.b.H.

Test Certificate

Flexural Test

Order No.....J1080466
 Test Standard.....ASTM D790
 Tester.....abd

Material.....PP C pvdF III
 Tested on.....2008-11-24
 Kondisi Uji.....22.1oC,RH61%

Testing machine.....AGS-G
 Test speed 1.....0 % -> 1.576 mm/min

Directory.....J1080466PP C pvdF
 Parameterset.....astm d790

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width

Ls.....Support span
 Ef.....E-Modulus
 "fM.....Flexural strength

Test No	BNo	a mm	b mm	Ls mm	Ef GPa	"fM MPa
12	PP C pvdF III-1	3.750	12.16	60.00	5.692	22.12
13	PP C pvdF III-2	3.720	12.19	59.52	4.711	21.12
14	PP C pvdF III-3	3.700	12.37	59.20	5.166	21.24
15	PP C pvdF III-4	3.700	12.06	59.20	5.977	22.52
16	PP C pvdF III-5	3.690	11.56	59.20	5.273	19.96
Mean:		3.712	12.07	59.42	5.364	21.39
Minimum:		3.690	11.56	59.20	4.711	19.96
Maximum:		3.750	12.37	60.00	5.977	22.52
Std.dev.:		0.024	0.305	0.351	0.489	0.994
W(0.95) %:		0.798	3.140	0.732	11.32	5.767
Values:		5	5	5	5	5

Lampiran 9 Hasil Pengujian Kelenturan Formula 4

MESSPHYSIK Laborgeräteges.m.b.H.

Test Certificate

Flexural Test

Order No.....J1080466
 Test Standard.....ASTM D790
 Tester.....abd

Material.....PP C pvdf IV
 Tested on.....2008-11-24
 Kondisi Uji.....22.1oC,RH61%

Testing machine.....AGS-G
 Test speed 1.....0 % -> 1.588 mm/min

Directory.....J1080466PP C pvdf
 Parameterset.....astm d790

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width

Ls.....Support span
 Ef.....E-Modulus
 σ_{FM}Flexural strength

Test No	BNo	a mm	b mm	Ls mm	Ef GPa	σ_{FM} MPa
17	PP C pvdf IV-1	3.660	12.36	58.56	5.418	20.76
18	PP C pvdf IV-2	3.770	12.16	60.32	5.497	22.80
19	PP C pvdf IV-3	3.760	11.55	60.16	6.010	21.88
20	PP C pvdf IV-4	3.740	12.13	59.84	5.011	23.13
21	PP C pvdf IV-5	3.720	12.43	59.52	6.087	21.81
Mean:		3.730	12.13	59.68	5.605	22.08
Minimum:		3.660	11.55	58.56	5.011	20.76
Maximum:		3.770	12.43	60.32	6.087	23.13
Std.dev.:		0.044	0.346	0.697	0.446	0.932
W(0.95) %:		1.451	3.547	1.451	9.880	5.242
Values:		5	5	5	5	5

Lampiran 10 Hasil Pengujian Kelenturan PP Murni

Test Certificate**Flexural Test**

Order No.....J1080466
 Test Standard.....ASTM D790
 Tester.....abd

Material.....PP
 Tested on.....2008-12-10
 Kondisi Uji.....24oC,RH56%

Testing machine.....AGS-G
 Test speed 1.....0 % -> 1.729 mm/min

Directory.....J1080466ftPP C pvdf
 Parameterset.....astm d790

Legend

BNo.....Batch number
 a.....Thickness
 b.....Width

Ls.....Support span
 Ef.....E-Modulus
 "fM.....Flexural strength

Test No	BNo	a mm	b mm	Ls mm	Ef GPa	"fM MPa
87	PP -1	4.070	12.23	65.12	1.126	40.33
88	PP -2	4.070	12.07	65.12	1.233	41.84
89	PP -3	4.050	11.72	64.80	1.131	40.45
90	PP -4	4.050	12.04	64.80	1.177	41.76
91	PP -5	4.050	11.86	64.80	1.123	41.80
Mean:		4.058	11.98	64.93	1.158	41.24
Minimum:		4.050	11.72	64.80	1.123	40.33
Maximum:		4.070	12.23	65.12	1.233	41.84
Std.dev.:		0.011	0.198	0.175	0.047	0.774
W(0.95) %:		0.335	2.047	0.335	5.075	2.330
Values:		5	5	5	5	5

Lampiran 11 Hasil Pengujian Konduktivitas

Data konduktifitas sample noname (s)

Conductivity data of sample noname (s)

f(Hz)	$\sigma(\text{S/cm}), S = \text{Siemen} = 1/\text{Ohm}$			
	S1	S2	S3	S4
0.1	1.297E-02	1.976E-04	3.627E+00	1.596E+00
1	1.306E-02	1.983E-04	3.377E+00	1.566E+00
10	1.308E-02	1.981E-04	3.338E+00	1.551E+00
20	1.309E-02	1.990E-04	3.323E+00	1.544E+00
30	1.310E-02	1.995E-04	3.313E+00	1.533E+00
40	1.309E-02	2.000E-04	3.330E+00	1.524E+00
50	1.308E-02	1.991E-04	3.297E+00	1.521E+00
60	1.309E-02	1.990E-04	3.311E+00	1.519E+00
70	1.309E-02	1.986E-04	3.304E+00	1.515E+00
80	1.309E-02	1.995E-04	3.268E+00	1.507E+00
90	1.309E-02	2.003E-04	3.282E+00	1.509E+00
100	1.310E-02	2.002E-04	3.268E+00	1.511E+00
200	1.311E-02	2.003E-04	3.278E+00	1.501E+00
300	1.311E-02	1.998E-04	3.271E+00	1.503E+00
400	1.311E-02	2.002E-04	3.265E+00	1.503E+00
500	1.312E-02	2.007E-04	3.276E+00	1.501E+00
600	1.312E-02	1.995E-04	3.244E+00	1.501E+00
700	1.312E-02	2.000E-04	3.250E+00	1.499E+00
800	1.311E-02	1.999E-04	3.257E+00	1.498E+00
900	1.312E-02	2.000E-04	3.251E+00	1.497E+00
1000	1.311E-02	2.002E-04	3.248E+00	1.495E+00
2000	1.311E-02	2.001E-04	3.244E+00	1.495E+00

3000	1.312E-02	2.003E-04	3.252E+00	1.511E+00
4000	1.312E-02	2.003E-04	3.250E+00	1.510E+00
5000	1.312E-02	2.004E-04	3.251E+00	1.511E+00
6000	1.312E-02	2.009E-04	3.243E+00	1.509E+00
7000	1.311E-02	2.004E-04	3.239E+00	1.510E+00
8000	1.312E-02	2.004E-04	3.238E+00	1.508E+00
9000	1.312E-02	2.004E-04	3.232E+00	1.509E+00
10000	1.312E-02	2.003E-04	3.230E+00	1.508E+00
20000	1.314E-02	2.018E-04	3.226E+00	1.508E+00
30000	1.314E-02	2.028E-04	3.206E+00	1.505E+00
40000	1.314E-02	2.032E-04	3.191E+00	1.500E+00
50000	1.315E-02	2.040E-04	3.172E+00	1.497E+00
60000	1.315E-02	2.045E-04	3.141E+00	1.486E+00
70000	1.315E-02	2.054E-04	3.124E+00	1.474E+00
80000	1.315E-02	2.059E-04	3.080E+00	1.461E+00
90000	1.315E-02	2.066E-04	3.048E+00	1.450E+00
100000	1.315E-02	2.073E-04	3.018E+00	1.435E+00
$\sigma(\text{S/cm})$ rata-rata	1.311E-02	2.009E-04	3.250E+00	1.507E+00

Konduktivitas Listrik Rata-rata :

$\sigma(\text{S/cm})$ rata-rata			
S1	S2	S3	S4
0.01311	0.0002009	3.250	1.507

Lampiran 12 Hasil Pengujian *Melt Flow Index*

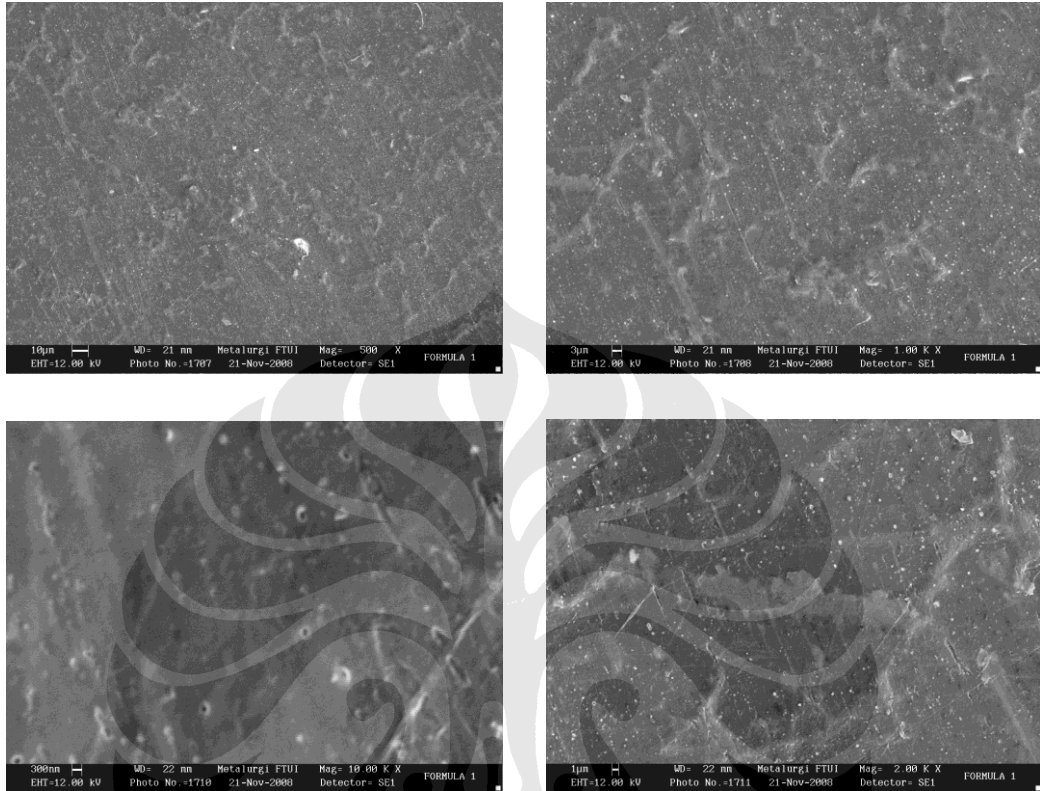
Formula 1

Formula 2

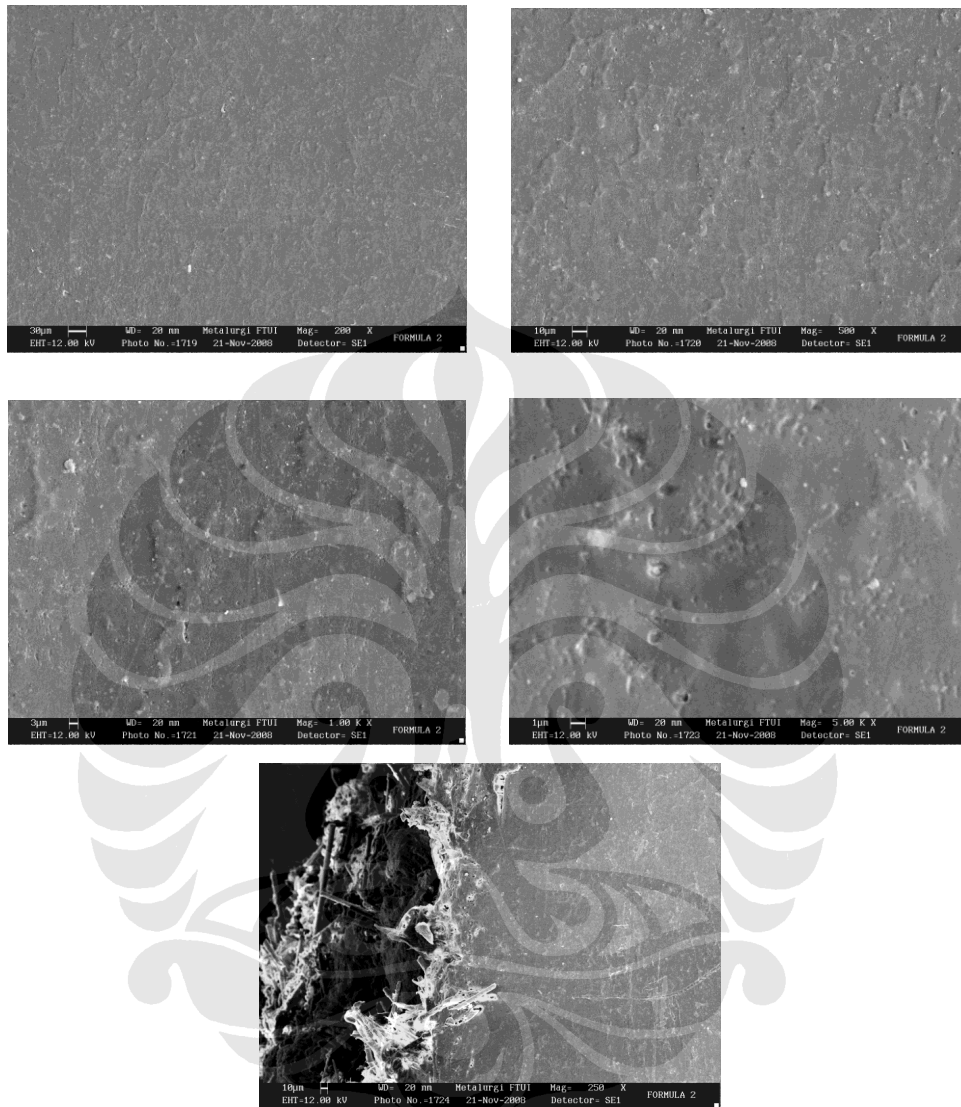
No.	Weight (g)	MFI (g/10 menit)
1	0,051	2,04
2	0,051	2,04
3	0,0518	2,072
4	0,0525	2,1
5	0,0523	2,092
6	0,0506	2,024
7	0,0537	2,148
8	0,0536	2,144
9	0,0519	2,076
10	0,051	2,04
11	0,0515	2,06
12	0,0578	2,312
13	0,0526	2,104
14	0,0508	2,032
15	0,0526	2,104
16	0,0503	2,012
17	0,0504	2,016
18	0,0513	2,052
19	0,052	2,08
20	0,0524	2,096
	Rata-rata	2,0822

No.	Weight (g)	MFI (g/10 menit)
1	0,0457	1,828
2	0,0469	1,876
3	0,0452	1,808
4	0,044	1,76
5	0,0447	1,788
6	0,0457	1,828
7	0,0476	1,904
8	0,0453	1,812
9	0,0437	1,748
10	0,0468	1,872
11	0,0437	1,748
12	0,0449	1,796
13	0,0436	1,744
14	0,0472	1,888
15	0,047	1,88
16	0,0448	1,792
17	0,0444	1,776
18	0,0437	1,748
19	0,0462	1,848
20	0,0443	1,772
	Rata-rata	1,8108

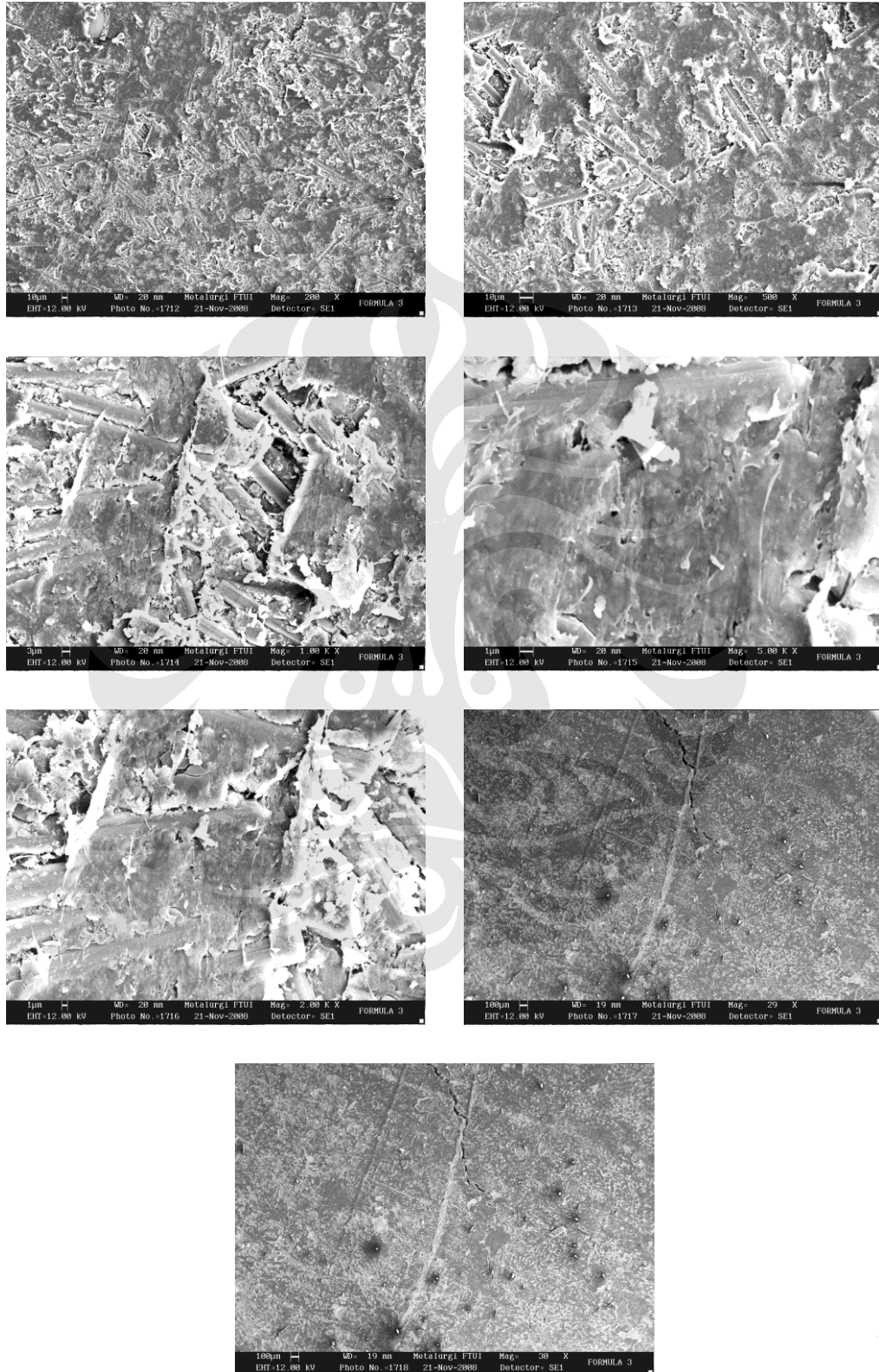
Lampiran 13 Hasil Foto SEM Formula 1



Lampiran 14 Hasil Foto SEM Formula 2



Lampiran 15 Hasil Foto SEM Formula 3



Lampiran 16 Hasil Foto SEM Formula 4

