

LAMPIRAN

Lampiran 1 TDS Polipropilena dari Chandra Asri

Trilene

Homopolymer Polypropylene

**Chandra Asri**

Technical Data Sheet (TDS)

HY3.8FY

Yarn Grade

TDS-PP-302-HY3.8FY-02

Product Description:

Trilene® HY3.8FY is a homopolymer polypropylene resin which is supplied in natural pellet form and suitable for woven bag, tarpaulin, geo-textile, raffia rope using blown process, carpet backing, as well as for strapping band and drinking straw requiring excellent strength and low water carry over (WCO).

Product Characteristics:

- High strength
- Excellent process-ability
- Low water carry over (WCO)

Applications:

- Woven bag, tarpaulin, geo-textile, raffia rope, carpet backing, cutting board
- Strapping band and drinking straw

Product Properties	Test Method*	Unit	Value
Melt Flow Rate (230 °C / 2.16 kg)	ASTM D 1238	g/10 min	3.8
Density	ASTM D 792	g/cm ³	0.9
Tensile Yield Strength (@50 mm/min)**	ASTM D 638	MPa	33
Tensile Yield Elongation**	ASTM D 638	%	12
Flexural Modulus (@1.3 mm/min)**	ASTM D 790A	MPa	1,300
Notched Izod Impact Strength (@23 °C)**	ASTM D 256	J/m	40
Hardness, Rockwell	ASTM D 785	R-Scale	100
Deflection Temperature (@0.455 MPa)	ASTM D 648	°C	104
Vicat Softening Temperature	ASTM D1525B	°C	152
Melting Temperature	ASTM D 3418	°C	158

*Polypropylene tested per ASTM D 4101

Sample thickness $\pm$ 3.4 mmConversion: 1 MPa = 10.2 kgf/cm²Recommended Processing Conditions:**

Melt Temperature.....230-250 °C

Chill Roll Temperature.....27-35 °C

Product Available Form:

Natural pellet

Packaging:

25 kg FFS Plastic Bags

Safety:

- The product is not classified as a hazardous material.
- Please refer to our Safety Data Sheet (SDS) for details on various aspects of safety, recovery and disposal of the product.

Hanwha

Ethylene Vinyl Acetate copolymer

EVA 2518 CO

Foam Molding Grade

MELT INDEX 2.5
VA CONTENT 18.0

Hanwha EVA 2518 CO is manufactured by IPC, an affiliate of Hanwha in The Kingdom of Saudi Arabia using an Exxon-Mobil high pressure tubular process and designed for variety of foam molding application such as shoes and sandals etc. EVA 2518 CO is well known for its excellent processability and high quality assurance.

▣ Outstanding Properties

Excellent Foam Molding Property
Very Good Mechanical Properties
Excellent Loading Property of Various Fillers
Good Elastic Property of Sponge

▣ Additives

Anti-Oxidant

▣ Physical Properties

Physical Properties	Value	Unit	Test Method
Melt Index (190 °C / 2.16 kg)	2.5	g/10min	ASTM D1238
Vinyl Acetate Content	18	wt%	ASTM D5594
Density	0.935	g/cm ³	ASTM D1505
Vicat Softening Point	64	°C	ASTM D1525
Melting Point	87	°C	ASTM D3418
Tensile Strength at Yield	5.2	MPa	ASTM D638
Tensile Strength at Break	11	MPa	ASTM D638
Elongation at Yield	260	%	ASTM D638
Elongation at Break	>800	%	ASTM D638
Flexural Modulus	60	MPa	ASTM D790
Hardness Shore A	76		ASTM D2240
Hardness Shore D	36		ASTM D2240

¹ These are typical values, not specifications. Some of the physical property values depend on the test equipment geometry and test conditions.



Hanwha Chemical Malaysia Sdn. Bhd., Level 22, Menara Citibank, 165 Jalan Ampang, 50450 Kuala Lumpur, Malaysia.
Tel: +60-3-2161-8001 Fax: +60-3-2163-6001

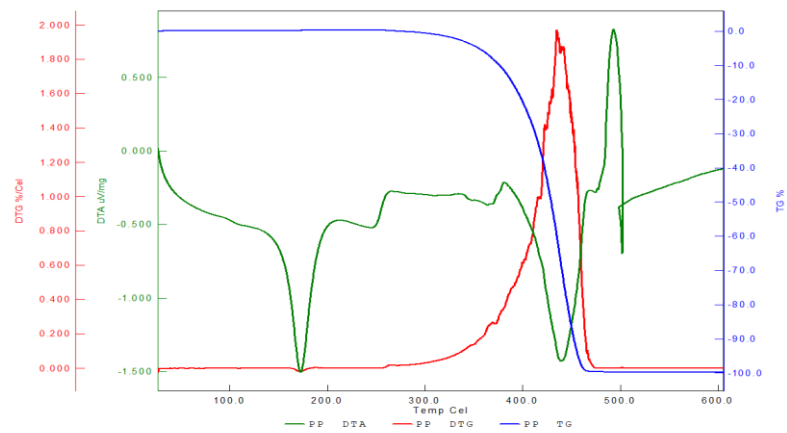
The preliminary information in this document is provided for pre-marketing purposes only, and relates only to the named product or materials when not in combination with any other product or materials. The information and recommendations presented herein are to the best of our knowledge true and accurate, but no warranty or guarantee, expressed or implied, is made. Before using one of the products mentioned herein, customers and other users should take care in determining the suitability of such product for the intended use. Hanwha Chemical and International Polymers Company do not accept any liability whatsoever arising from the use of this information or the use, application or processing of any product described herein.

Lampiran 3 TGA Polypropylene

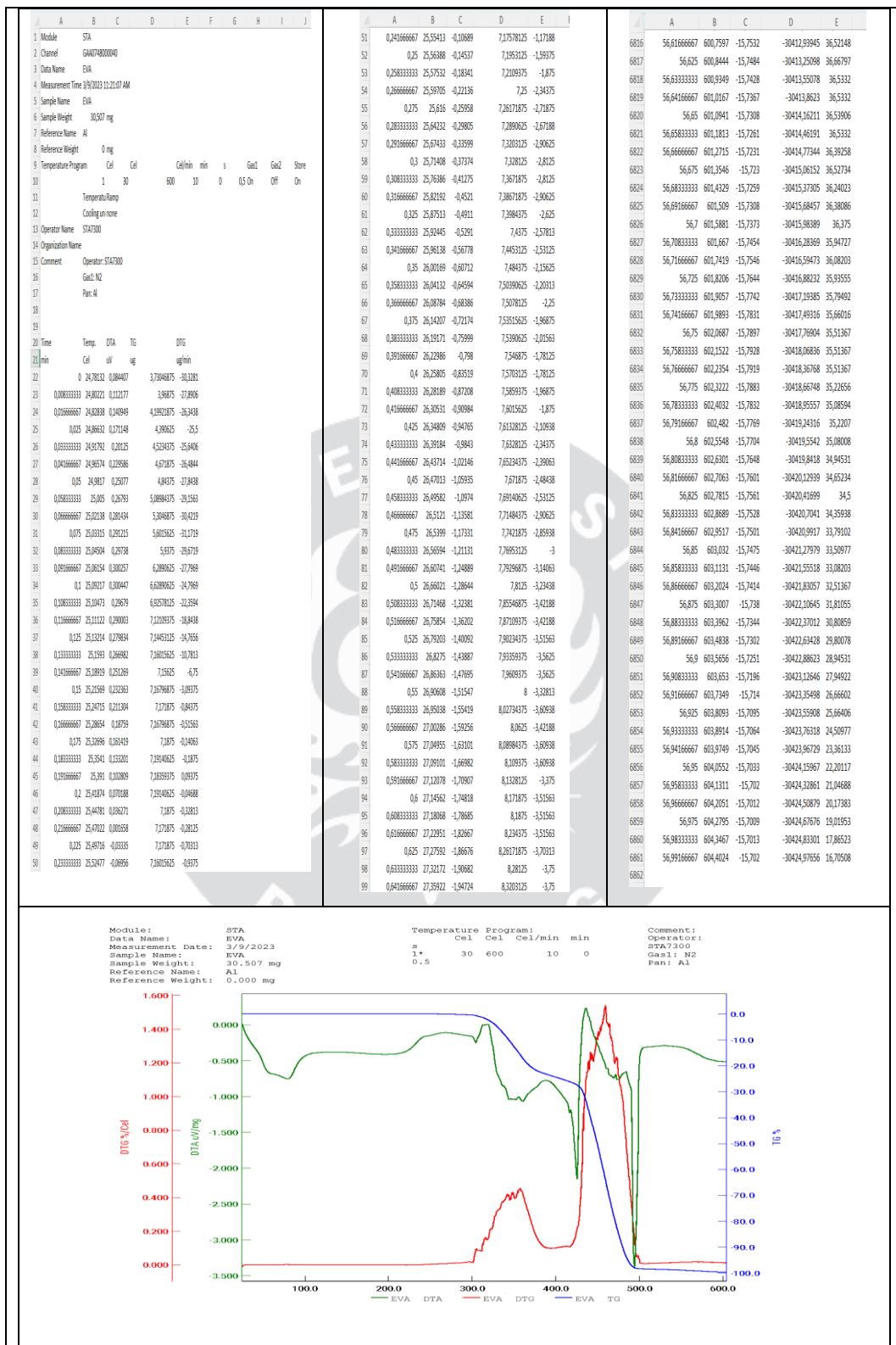
	A	B	C	D	E	F	G	H	I	J		A	B	C	D	E
1	Module	STA									53	0,258333	26,57426	0,361196	13,85938	-7,54688
2	Channel	GA40748000040									54	0,266667	26,59729	0,322428	13,91797	-7,5
3	Data Name	PP									55	0,275	26,60157	0,28121	13,99219	-7,125
4	Measurem	3/9/2023 1:59:22 PM									56	0,283333	26,60621	0,238368	14,05078	-7,35938
5	Sample Na	PP									57	0,291667	26,61248	0,194201	14,08984	-7,03125
6	Sample We	32,282 mg									58	0,3	26,64448	0,149414	14,16797	-6,79688
7	Reference	Al									59	0,308333	26,68299	0,103189	14,21484	-6,65625
8	Reference	0 mg									60	0,316667	26,71944	0,055883	14,26563	-6,14063
9	Temperature Program	Cel	Cel/min	min	s	Gas1	Gas2	Store			61	0,325	26,75065	0,008145	14,33594	-6,28125
10	1	30	600	10	0	0,5	On	Off	On		62	0,333333	26,78058	-0,03988	14,37109	-6,14063
11	Temperatu	Ramp									63	0,341667	26,80546	-0,088	14,42578	-5,71875
12	Cooling uni	none									64	0,35	26,82461	-0,13652	14,47266	-5,625
13	Operator A	STA7300									65	0,358333	26,86447	-0,18505	14,50391	-5,4375
14	Organization Name										66	0,366667	26,90258	-0,23407	14,57422	-5,29688
15	Comment	Operator: STA7300									67	0,375	26,93973	-0,28381	14,60156	-5,39063
16	Gas1:	N2									68	0,383333	26,97981	-0,33347	14,64453	-5,25
17	Pan:	Al									69	0,391667	27,00268	-0,38299	14,68359	-5,15625
18											70	0,4	27,02982	-0,43156	14,71875	-5,20313
19											71	0,408333	27,05924	-0,48018	14,77734	-4,82813
20	Time	Temp.	DTA	TG	DTG						72	0,416667	27,09486	-0,52838	14,82031	-4,92188
21	min	Cel	uV	ug	ug/min						73	0,425	27,13624	-0,5759	14,86328	-4,73438
22	0	26,0505	0,292284	7,265625	-42,2813						74	0,433333	27,17473	-0,62344	14,90234	-4,82813
23	0,008333	26,05588	0,32861	7,597656	-44,0625						75	0,441667	27,20281	-0,67123	14,9375	-4,64063
24	0,016667	26,04881	0,365132	7,90625	-46,1719						76	0,45	27,23859	-0,71845	14,97656	-4,40625
25	0,025	26,05165	0,402793	8,269531	-48,8906						77	0,458333	27,28968	-0,7652	15,001172	-4,3125
26	0,033333	26,07352	0,437536	8,683594	-51						78	0,466667	27,33187	-0,81132	15,03962	-3,98438
27	0,041667	26,07576	0,465834	9,082031	-52,5						79	0,475	27,36709	-0,85714	15,08594	-4,07813
28	0,05	26,0888	0,491972	9,59375	-52,4531						80	0,483333	27,40404	-0,90313	15,10547	-3,9375
29	0,058333	26,11647	0,516219	10,14063	-53,25						81	0,491667	27,4372	-0,94928	15,14453	-3,75
30	0,066667	26,12848	0,538506	10,68359	-53,1563						82	0,5	27,47493	-0,99593	15,17969	-3,79688
31	0,075	26,12987	0,558329	11,19922	-49,4063						83	0,508333	27,50105	-1,04301	15,19531	-3,60938
32	0,083333	26,14865	0,576674	11,64063	-45,5156						84	0,516667	27,52928	-1,08926	15,24219	-3,42188
33	0,091667	26,17414	0,593188	11,96875	-39,7969						85	0,525	27,56813	-1,13489	15,26563	-3,46875
34	0,1	26,19412	0,606926	12,34375	-33,7969						86	0,533333	27,59731	-1,18084	15,28906	-3,1875
35	0,108333	26,19527	0,617264	12,69922	-27,9844						87	0,541667	27,61982	-1,22596	15,32813	-3,09375
36	0,116667	26,194	0,625821	12,80078	-22,3594						88	0,55	27,63446	-1,27148	15,33984	-3,14063
37	0,125	26,19919	0,632267	12,875	-18						89	0,558333	27,66297	-1,31648	15,37109	-2,76563
38	0,133333	26,20046	0,636101	12,91016	-14,8125						90	0,566667	27,69964	-1,36129	15,39453	-2,71875
39	0,141667	26,19436	0,637716	12,95703	-11,0156						91	0,575	27,73486	-1,40595	15,40116	-2,67188
40	0,15	26,20722	0,636189	13,01563	-7,78125						92	0,583333	27,76318	-1,45028	15,4375	-2,39063
41	0,158333	26,21948	0,631527	13,0625	-6,98438						93	0,591667	27,79222	-1,49351	15,45703	-2,4375
42	0,166667	26,2368	0,624142	13,14063	-7,03125						94	0,6	27,82071	-1,53609	15,47266	-2,01563
43	0,175	26,25033	0,613664	13,20313	-7,54688						95	0,608333	27,84644	-1,57878	15,49219	-1,92188
44	0,183333	26,27332	0,600509	13,26172	-7,59375						96	0,616667	27,88074	-1,62155	15,51172	-1,78125
45	0,191667	26,32082	0,586056	13,34766	-7,875						97	0,625	27,92073	-1,66482	15,52734	-1,3125
46	0,2	26,36493	0,568147	13,38281	-7,92188						98	0,633333	27,97331	-1,70768	15,54297	-1,21875
47	0,208333	26,39063	0,545463	13,46094	-7,73438						99	0,641667	28,02	-1,7509	15,53906	-0,9375
48	0,216667	26,41036	0,521894	13,53906	-7,875						100	0,65	28,05727	-1,79421	15,55469	-0,79688
49	0,225	26,44534	0,494771	13,58984	-7,875						101	0,658333	28,09502	-1,83757	15,55859	-0,60938
50	0,233333	26,47194	0,464807	13,67188	-7,73438						102	0,666667	28,1342	-1,88069	15,54688	-0,46875
51	0,241667	26,50571	0,432886	13,72266	-8,01563						103	0,675	28,1717	-1,92372	15,55859	-0,32813
52	0,25	26,53893	0,398179	13,78516	-7,54688						104	0,683333	28,21278	-1,96697	15,55078	-0,32813
53	0,258333	26,57426	0,361196	13,85938	-7,54688											

Module: STA
Data Name: PP
Measurement Date: 3/9/2023
Sample Name: PP
Sample Weight: 32,282 mg
Reference Name: Al

Temperature Program:
Cel Cel Cel/min min s
Comment:
Operator: STA7300
Gas1: N2
Pan: Al

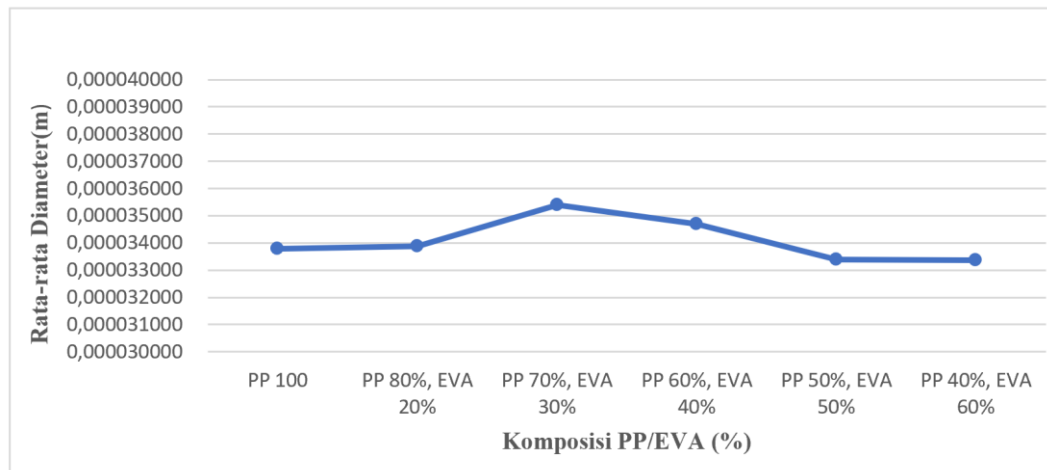


Lampiran 4 TGA EVA



Lampiran 5 Hasil Mikroskop Optik dengan Video analyzer

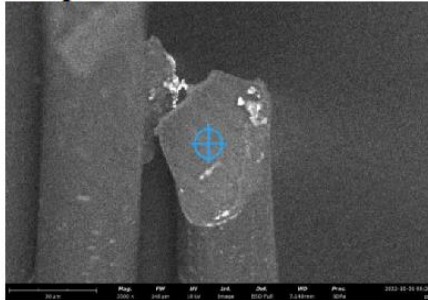
Komposisi	Rata-rata Diameter (m)
PP 100	0,000033785
PP 80%, EVA 20%	0,000033882
PP 70%, EVA 30%	0,000035405
PP 60%, EVA 40%	0,000034699
PP 50%, EVA 50%	0,000033389
PP 40%, EVA 60%	0,000033362



Lampiran 6 Hasil SEM PP 100

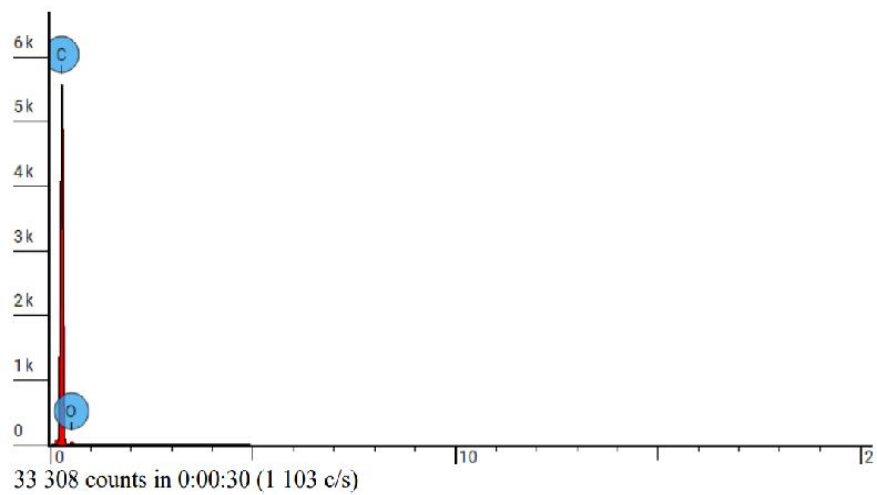
thermo scientific

1. Spot



FW: 148 μm , Mode: 10 kV - Image, Detector: BSD Full, Time: 10/6/22 8:24 AM

	Element Number	Element Symbol	Element Name	Atomic Conc.	Weight Conc.
	6	C	Carbon	100.000	100.000
	8	O	Oxygen	0.000	0.000

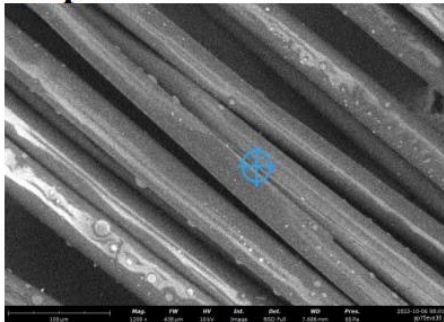


Disabled elements: -

Lampiran 7 Hasil SEM PP 70% EVA 30%

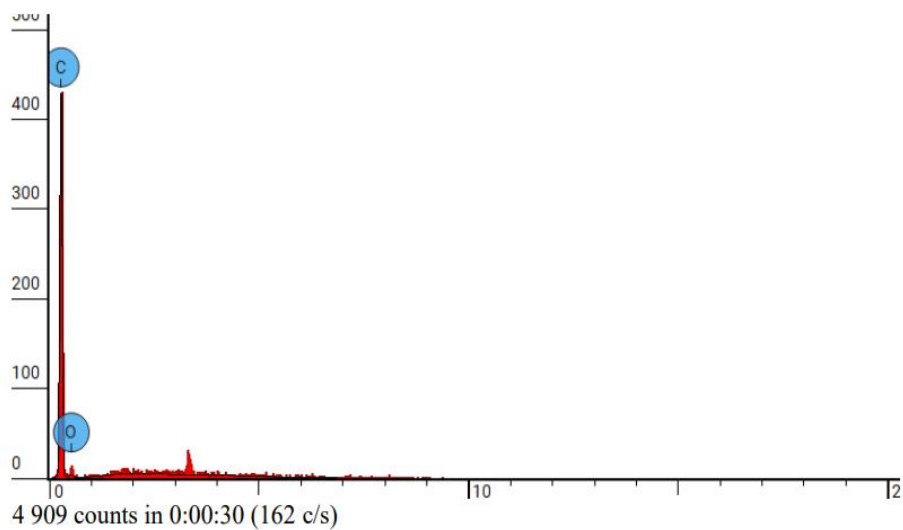
thermo scientific

1. Spot



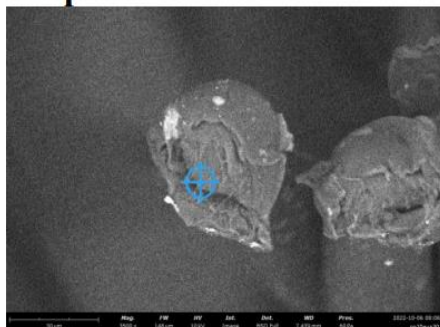
FW: 438 µm, Mode: 10 kV - Image, Detector: BSD Full, Time: 10/6/22 8:01 AM

	Element Number	Element Symbol	Element Name	Atomic Conc.	Weight Conc.
	6	C	Carbon	98.491	98.000
	8	O	Oxygen	1.509	2.000



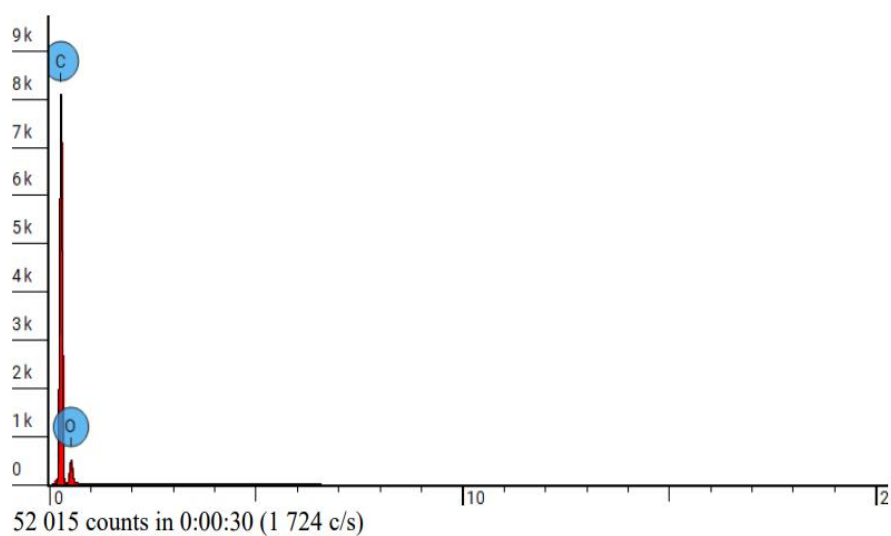
Disabled elements: -

1. Spot



FW: 148 μm , Mode: 10 kV - Image, Detector: BSD Full, Time: 10/6/22 8:06 AM

	Element Number	Element Symbol	Element Name	Atomic Conc.	Weight Conc.
	6	C	Carbon	88.546	85.300
	8	O	Oxygen	11.454	14.700



Disabled elements: -

Lampiran 8 Uji Nomor Benang PP/EVA Variasi Komposisi (SNI 2060;2010)

benang PP 100%

nomor benang

No	Panjang (m)	Berat (g)	Denier	Tex
1	1	0,03129	281,61	31,29
2	1	0,03192	287,28	31,92
3	1	0,03392	305,28	33,92
4	1	0,03475	312,75	34,75
5	1	0,03426	308,34	34,26
6	1	0,03429	308,61	34,29
7	1	0,03262	293,58	32,62
8	1	0,03224	290,16	32,24
9	1	0,03500	315,00	35,00
10	1	0,02966	266,94	29,66
11	1	0,03009	270,81	30,09
12	1	0,03421	307,89	34,21
13	1	0,03178	286,02	31,78
14	1	0,03109	279,81	31,09
15	1	0,02970	267,30	29,70
16	1	0,03259	293,31	32,59
17	1	0,03278	295,02	32,78
18	1	0,03056	275,04	30,56
19	1	0,03157	284,13	31,57
20	1	0,03314	298,26	33,14
		rata-rata	291,36	32,37
		s	15,10	1,68
		cv	5,181463	5,181463

benang PP 100%

kekuatan tarik

No	Kek (gf)	mulur (mm)	mulur (%)
1	1340	186,00	74,40
2	1350	186,50	74,60
3	1310	164,50	65,80
4	1260	220,00	88,00
5	1260	237,00	94,80
6	1290	202,50	81,00
7	1290	210,00	84,00
8	1330	177,00	70,80
9	1320	238,00	95,20
10	1310	228,00	91,20
11	1360	140,00	56,00
12	1340	250,00	100,00
13	1320	227,00	90,80
14	1300	199,50	79,80
15	1280	175,00	70,00
16	1325	91,00	36,40
17	1280	178,00	71,20
18	1250	180,00	72,00
19	1330	198,50	79,40
20	1320	203,00	81,20
rata-rata gf	1308,25		77,83
s	31,17		14,77
cv	2,382826		18,9798148
rata-rata cN	1282,085		
Tenacity (g/Tex)	40,41176		
Tenacity (g/Den)	4,490196		
Tenacity (cN/Tex)	39,60353		
Tenacity (cN/Den)	4,400392		

benang PP 80% : eva 20%

nomor benang

No	Panjang (m)	Berat (g)	Denier	Tex
1	0,5	0,01606	289,08	32,12
2	0,5	0,01497	269,46	29,94
3	0,5	0,01379	248,22	27,58
4	0,5	0,01393	250,74	27,86
5	0,5	0,01478	266,04	29,56
6	0,5	0,01535	276,30	30,70
7	0,5	0,01625	292,50	32,50
8	0,5	0,01706	307,08	34,12
9	0,5	0,01608	289,44	32,16
10	0,5	0,01541	277,38	30,82
11	0,5	0,01576	283,68	31,52
12	0,5	0,01663	299,34	33,26
13	0,5	0,01656	298,08	33,12
14	0,5	0,01561	280,98	31,22
15	0,5	0,01580	284,40	31,60
16	0,5	0,01612	290,16	32,24
17	0,5	0,01669	300,42	33,38
18	0,5	0,01645	296,10	32,90
19	0,5	0,01575	283,50	31,50
20	0,5	0,01608	289,44	32,16
		rata-rata	283,62	31,51
		s	15,57	1,73
		cv	5,490759	5,490759

benang PP 80% : eva 20%

kekuatan tarik

No	Kek (gf)	mulur (mm)	mulur (%)
1	1085	159,00	63,60
2	1005	142,00	56,80
3	1050	143,00	57,20
4	985	128,00	51,20
5	1050	178,00	71,20
6	1085	180,00	72,00
7	1010	184,00	73,60
8	1040	155,00	62,00
9	1050	145,00	58,00
10	1050	145,00	58,00
11	1005	129,00	51,60
12	1055	165,00	66,00
13	1035	155,00	62,00
14	1040	120,00	48,00
15	1015	170,00	68,00
16	1040	152,00	60,80
17	1025	202,00	80,80
18	995	154,00	61,60
19	1015	180,00	72,00
20	1000	174,00	69,60
rata-rata gf	1031,75		63,20
s	27,92		8,46
cv	2,706333		13,389912
rata-rata cN	1011,115		
Tenacity (g/Tex)	32,74046		
Tenacity (g/Den)	3,637828		
Tenacity (cN/Tex)	32,08565		
Tenacity (cN/Den)	3,565072		

benang PP 70% : eva 30%

nomor benang

No	Panjang (m)	Berat (g)	Denier	Tex
1	0,5	0,01666	299,88	33,32
2	0,5	0,01566	281,88	31,32
3	0,5	0,01487	267,66	29,74
4	0,5	0,01433	257,94	28,66
5	0,5	0,01388	249,84	27,76
6	0,5	0,01637	294,66	32,74
7	0,5	0,01559	280,62	31,18
8	0,5	0,01507	271,26	30,14
9	0,5	0,01490	268,20	29,80
10	0,5	0,01430	257,40	28,60
11	0,5	0,01509	271,62	30,18
12	0,5	0,01487	267,66	29,74
13	0,5	0,01613	290,34	32,26
14	0,5	0,01562	281,16	31,24
15	0,5	0,01545	278,10	30,90
16	0,5	0,01549	278,82	30,98
17	0,5	0,01529	275,22	30,58
18	0,5	0,01522	273,96	30,44
19	0,5	0,01501	270,18	30,02
20	0,5	0,01596	287,28	31,92
		rata-rata	275,18	30,58
		s	12,50	1,39
		cv	4,543087	4,543087

benang PP 70% : eva 30%

kekuatan tarik

No	Kek (gf)	mulur (mm)	mulur %
1	840	159,00	63,60
2	850	158,00	63,20
3	850	137,00	54,80
4	840	138,00	55,20
5	850	150,00	60,00
6	850	136,00	54,40
7	840	130,00	52,00
8	850	152,00	60,80
9	850	158,00	63,20
10	800	137,00	54,80
11	850	132,00	52,80
12	850	135,00	54,00
13	800	120,00	48,00
14	830	140,00	56,00
15	820	130,00	52,00
16	750	136,00	54,40
17	850	120,00	48,00
18	800	124,00	49,60
19	845	166,00	66,40
20	890	122,00	48,80
rata-rata	835,25		55,60
s	29,36		5,53
cv	3,51464		9,9467527
rata-rata cN	818,545		
Tenacity (g/Tex)	27,31718		
Tenacity (g/Den)	3,035242		
Tenacity (cN/Tex)	26,77083		
Tenacity (cN/Den)	2,974537		

benang PP 60% : eva 40%

nomor benang

No	Panjang (m)	Berat (g)	Denier	Tex
1	1	0,03014	271,26	30,14
2	1	0,02948	265,32	29,48
3	1	0,03127	281,43	31,27
4	1	0,03232	290,88	32,32
5	1	0,03208	288,72	32,08
6	1	0,03095	278,55	30,95
7	1	0,03363	302,67	33,63
8	1	0,03160	284,40	31,60
9	1	0,02973	267,57	29,73
10	1	0,02879	259,11	28,79
11	1	0,03150	283,50	31,50
12	1	0,03157	284,13	31,57
13	1	0,03219	289,71	32,19
14	1	0,02737	246,33	27,37
15	1	0,03168	285,12	31,68
16	1	0,03140	282,60	31,40
17	1	0,02960	266,40	29,60
18	1	0,03007	270,63	30,07
19	1	0,02963	266,67	29,63
20	1	0,03126	281,34	31,26
		rata-rata	277,32	30,81
		s	13,00	1,44
		cv	4,689339	4,689339

benang PP 60% : eva 40%

kekuatan tarik

No	Kek (gf)	mulur (mm)	mulur (%)
1	835	106,50	42,60
2	825	136,00	54,40
3	870	71,00	28,40
4	805	73,00	29,20
5	860	73,00	29,20
6	830	101,00	40,40
7	790	105,00	42,00
8	815	100,00	40,00
9	850	93,00	37,20
10	830	74,00	29,60
11	825	76,50	30,60
12	860	70,00	28,00
13	845	92,00	36,80
14	825	77,50	31,00
15	830	71,50	28,60
16	725	69,00	27,60
17	785	121,00	48,40
18	800	84,00	33,60
19	875	68,50	27,40
20	825	105,00	42,00
rata-rata	825,25		35,35
s	34,12		7,78
cv	4,134919		22,0202566
rata-rata cN	808,745		
Tenacity (g/Tex)	26,78253		
Tenacity (g/Den)	2,975836		
Tenacity (cN/Tex)	26,24688		
Tenacity (cN/Den)	2,91632		

benang PP 50% : eva 50%

nomor benang

No	Panjang (m)	Berat (g)	Denier	Tex
1	1	0,03488	313,92	34,88
2	1	0,03320	298,80	33,20
3	1	0,03458	311,22	34,58
4	1	0,03375	303,75	33,75
5	1	0,03367	303,03	33,67
6	1	0,03398	305,82	33,98
7	1	0,03379	304,11	33,79
8	1	0,03298	296,82	32,98
9	1	0,03327	299,43	33,27
10	1	0,03288	295,92	32,88
11	1	0,03491	314,19	34,91
12	1	0,03272	294,48	32,72
13	1	0,03383	304,47	33,83
14	1	0,03342	300,78	33,42
15	1	0,03267	294,03	32,67
16	1	0,03296	296,64	32,96
17	1	0,03367	303,03	33,67
18	1	0,03477	312,93	34,77
19	1	0,03487	313,83	34,87
20	1	0,03456	311,04	34,56
		rata-rata	303,91	33,77
		s	6,90	0,77
		cv	2,270876	2,270876

benang PP 50% : eva 50%

kekuatan tarik

No	Kek (gf)	mulur (mm)	mulur (%)
1	735	92,50	37,00
2	740	80,00	32,00
3	695	70,00	28,00
4	640	83,50	33,40
5	675	116,00	46,40
6	670	94,50	37,80
7	610	107,50	43,00
8	610	86,00	34,40
9	680	88,50	35,40
10	655	119,50	47,80
11	695	118,00	47,20
12	685	142,00	56,80
13	640	139,50	55,80
14	660	73,50	29,40
15	625	68,00	27,20
16	635	95,50	38,20
17	705	80,00	32,00
18	700	102,50	41,00
19	650	137,50	55,00
20	630	116,00	46,40
rata-rata	666,75		40,21
s	37,85		9,24
cv	5,676157		22,9778256
rata-rata cN	653,415		
Tenacity (g/Tex)	19,74502		
Tenacity (g/Den)	2,193892		
Tenacity (cN/Tex)	19,35012		
Tenacity (cN/Den)	2,150014		

benang PP 40% : eva 60%

nomor benang

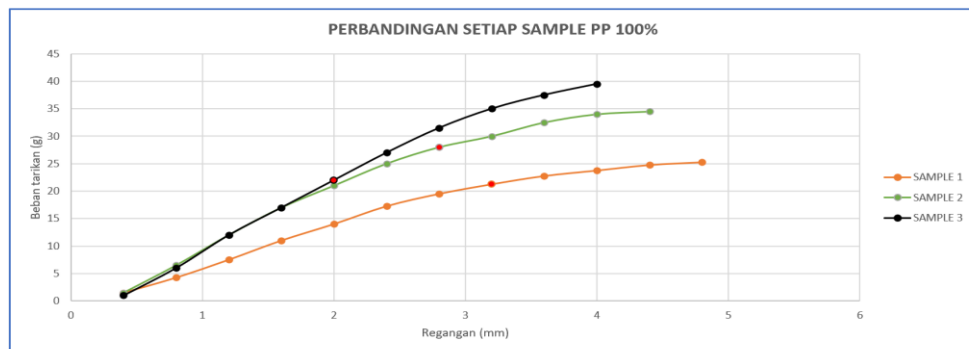
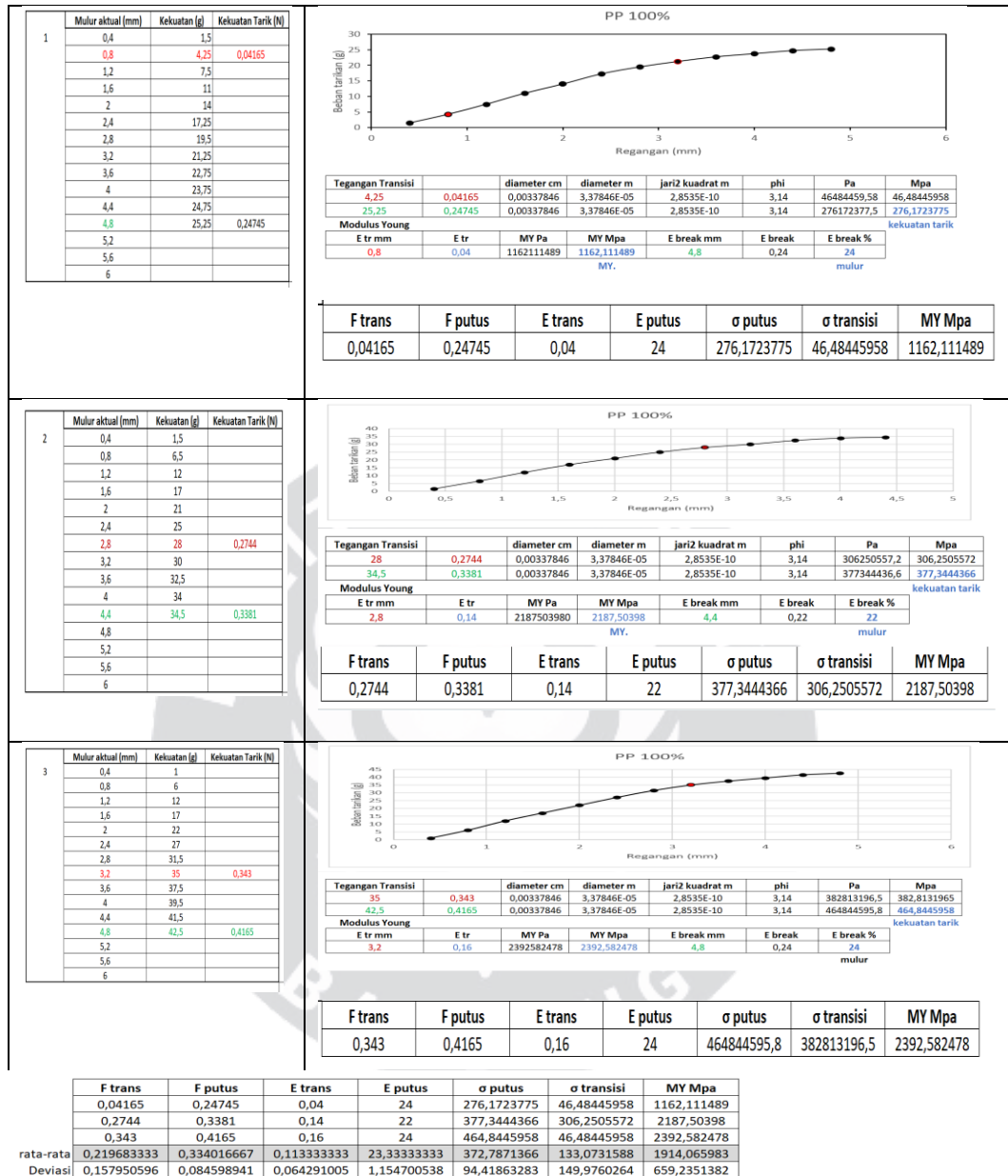
No	Panjang (m)	Berat (g)	Denier	Tex
1	1	0,03274	294,66	32,74
2	1	0,03237	291,33	32,37
3	1	0,03242	291,78	32,42
4	1	0,03241	291,69	32,41
5	1	0,03228	290,52	32,28
6	1	0,03227	290,43	32,27
7	1	0,03234	291,06	32,34
8	1	0,03239	291,51	32,39
9	1	0,03227	290,43	32,27
10	1	0,03226	290,34	32,26
11	1	0,03233	290,97	32,33
12	1	0,03223	290,07	32,23
13	1	0,03226	290,34	32,26
14	1	0,02780	250,20	27,80
15	1	0,03321	298,89	33,21
16	1	0,03256	293,04	32,56
17	1	0,03369	303,21	33,69
18	1	0,03238	291,42	32,38
19	1	0,03244	291,96	32,44
20	1	0,03236	291,24	32,36
		rata-rata	290,25	32,25
		s	9,97	1,11
		cv	3,434035	3,434035

benang PP 40% : eva 60%

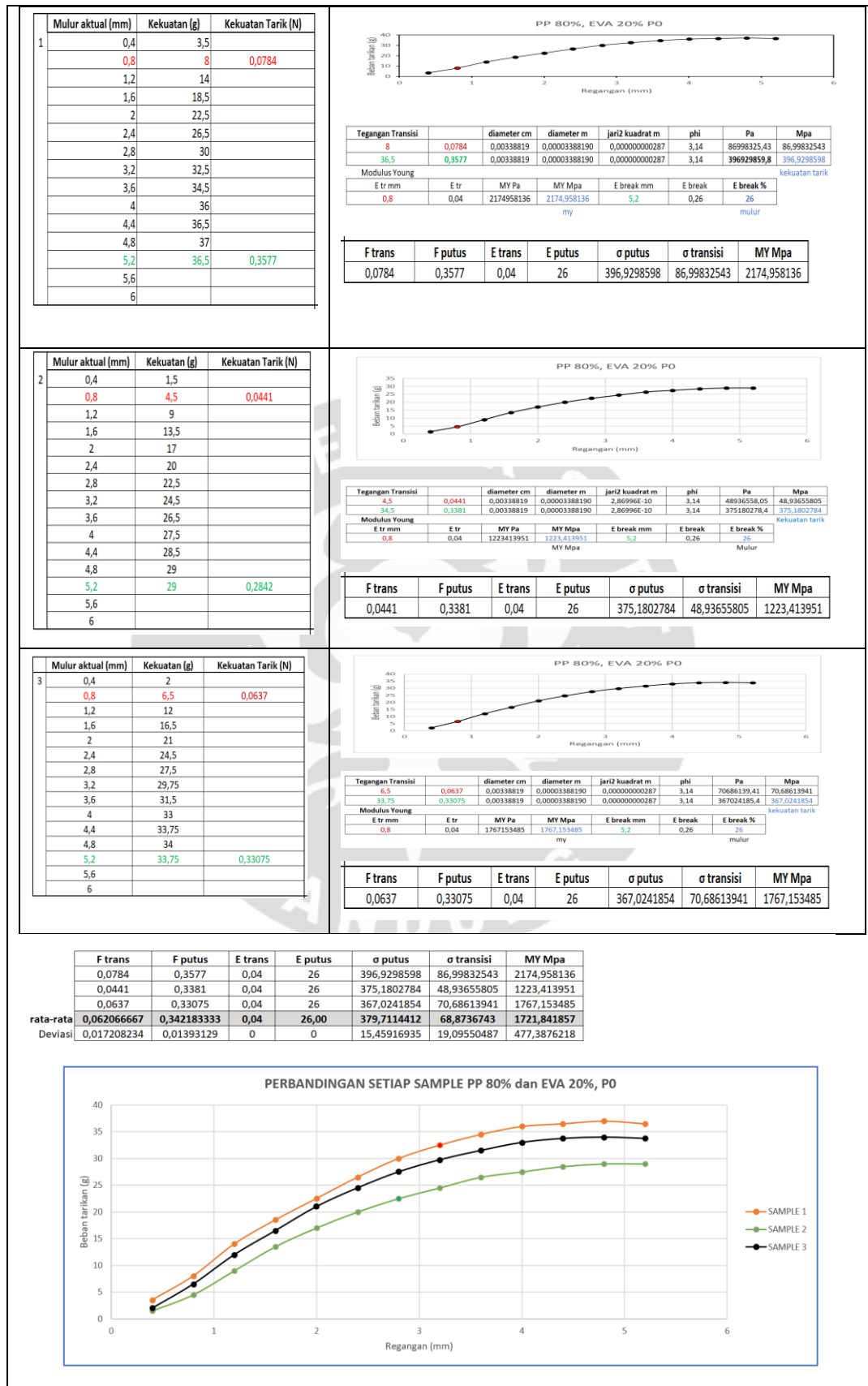
kekuatan tarik

No	Kek (gf)	mulur (mm)	mulur %)
1	450	108,50	43,40
2	455	155,00	62,00
3	485	72,00	28,80
4	405	101,50	40,60
5	480	70,00	28,00
6	405	107,00	42,80
7	460	102,50	41,00
8	450	116,00	46,40
9	490	148,50	59,40
10	450	235,00	94,00
11	460	170,00	68,00
12	410	97,00	38,80
13	490	100,00	40,00
14	450	77,50	31,00
15	435	78,50	31,40
16	465	67,50	27,00
17	525	140,00	56,00
18	500	140,00	56,00
19	425	208,00	83,20
20	455	132,50	53,00
rata-rata	457,25	121,35	48,54
s	31,93		18,22
cv	6,983551		37,53048
rata-rata cN	448,105		
Tenacity (g/Tex)	14,17807		
Tenacity (g/Den)	1,575342		
Tenacity (cN/Tex)	13,89451		
Tenacity (cN/Den)	1,543835		

Lampiran 9 Uji kekuatan Tarik, Mulur dan modulus Young PP dan PP/EVA (SNI7650:2010)



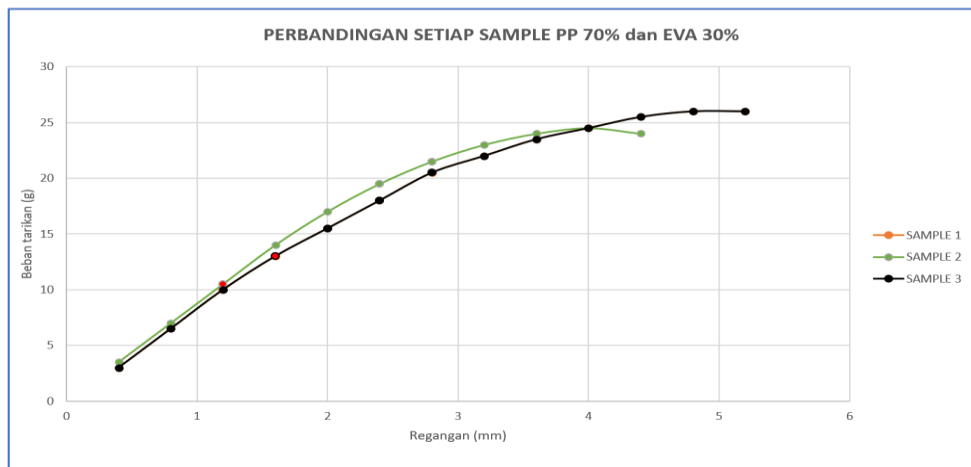
Uji kekuatan Tarik, Mulur dan modulus Young PP80%EVA20%



Uji kekuatan Tarik, Mulur dan modulus Young PP70%EVA30%



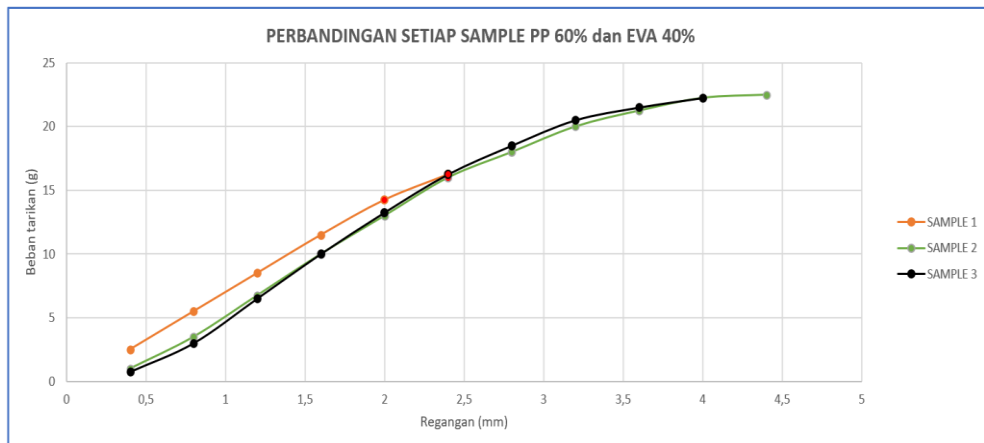
	F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
	0,1274	0,3283	0,08	26	333,6296721	129,468231	1618,352887
	0,1666	0,2352	0,1	22	239,0182726	169,3046097	1693,046097
	0,0637	0,2548	0,04	26	258,936462	64,73411549	1618,352887
rata-rata	0,119233333	0,272766667	0,073333333	24,66666667	277,1948022	121,1689854	1643,250624
Deviasi	0,051933836	0,049081599	0,030550505	2,309401077	49,87839686	52,77693791	43,124145



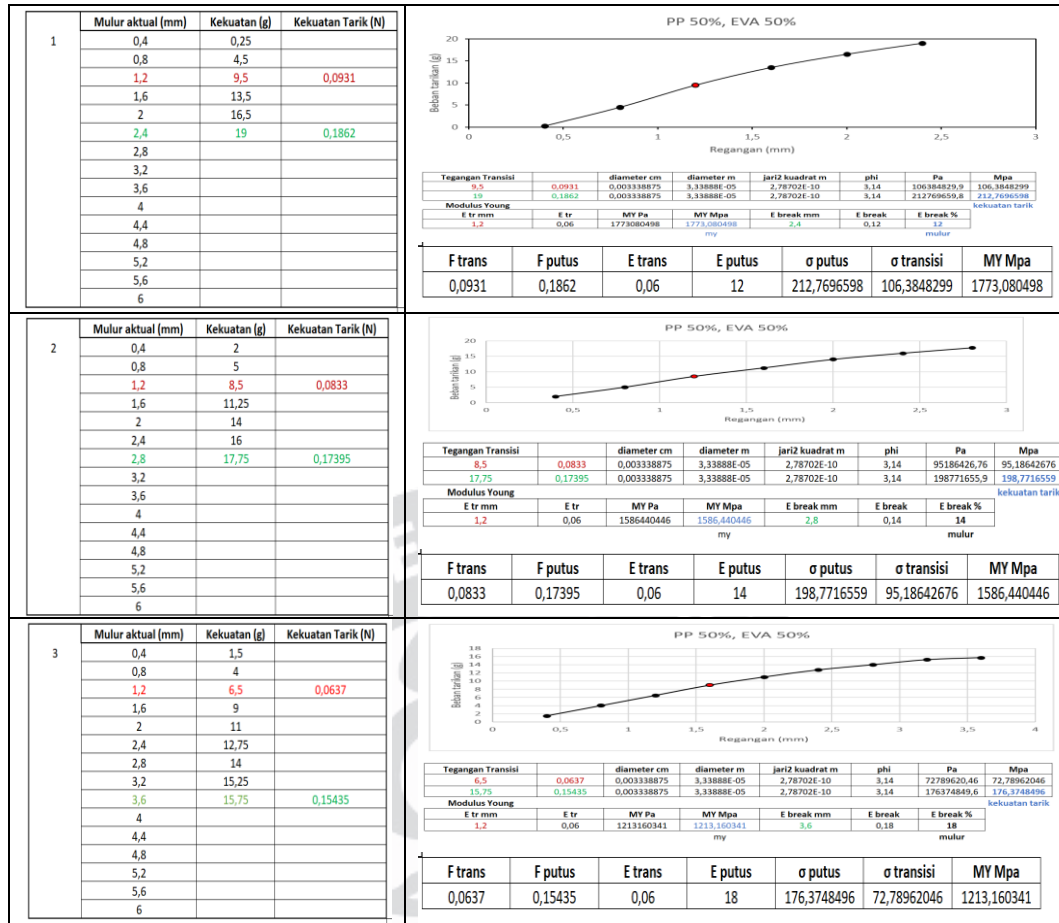
Uji kekuatan Tarik, Mulur dan modulus Young PP60% EVA40%



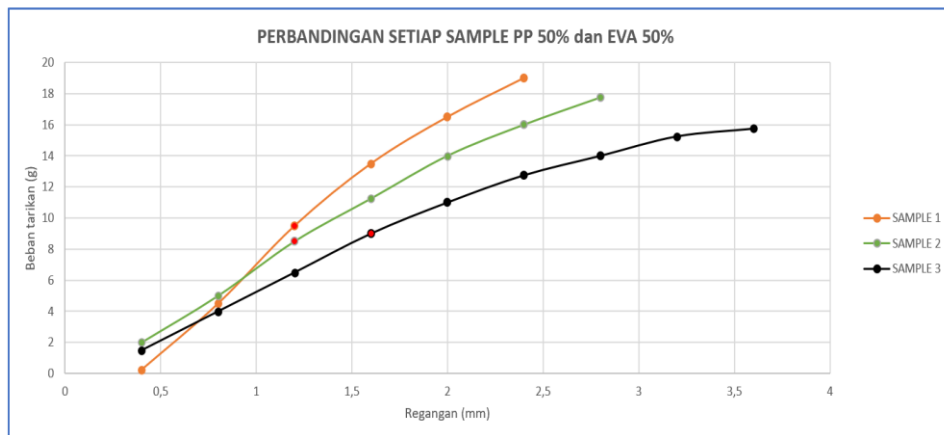
	F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
	0,15925	0,1911	0,12	18	202,1926929	168,4939108	1404,115923
	0,1568	0,2205	0,12	22	233,2992611	165,9016968	1382,51414
	0,15925	0,21805	0,12	20	230,7070471	168,4939108	1404,115923
rata-rata	0,158433333	0,209883333	0,12	20	222,0663337	167,6298395	1396,915329
Deviasi	0,001414508	0,016312904	0	2	17,25981145	1,496615458	12,47179548



Uji kekuatan Tarik, Mulur dan modulus Young PP50% EVA50%



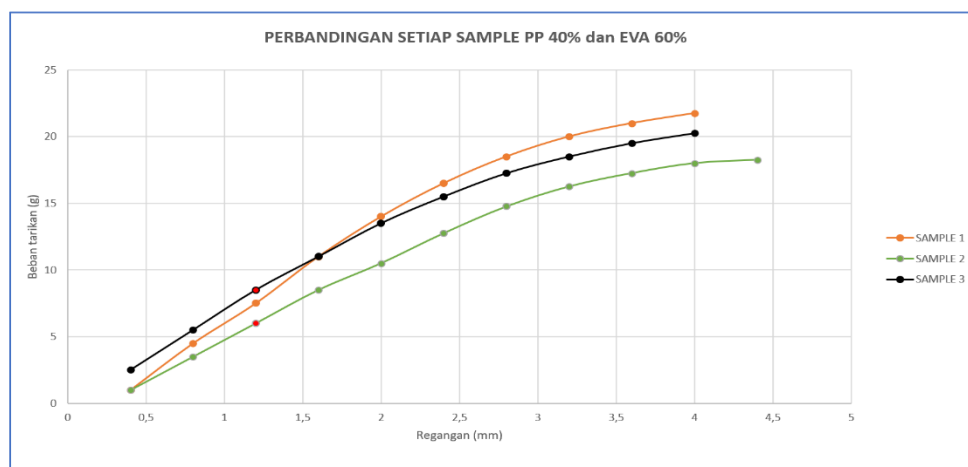
	F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
	0,0931	0,1862	0,06	12	212,7696598	106,3848299	1773,080498
	0,0833	0,17395	0,06	14	198,7716559	95,18642676	1586,440446
	0,0637	0,15435	0,06	18	176,3748496	72,78962046	1213,160341
rata-rata	0,080033333	0,1715	0,06	14,66666667	195,9720551	91,45362571	1524,227095
Deviasi	0,014969747	0,016065724	0	3,055050463	18,35821005	17,10584336	285,0973894



Uji kekuatan Tarik, Mulur dan modulus Young PP60% EVA40%

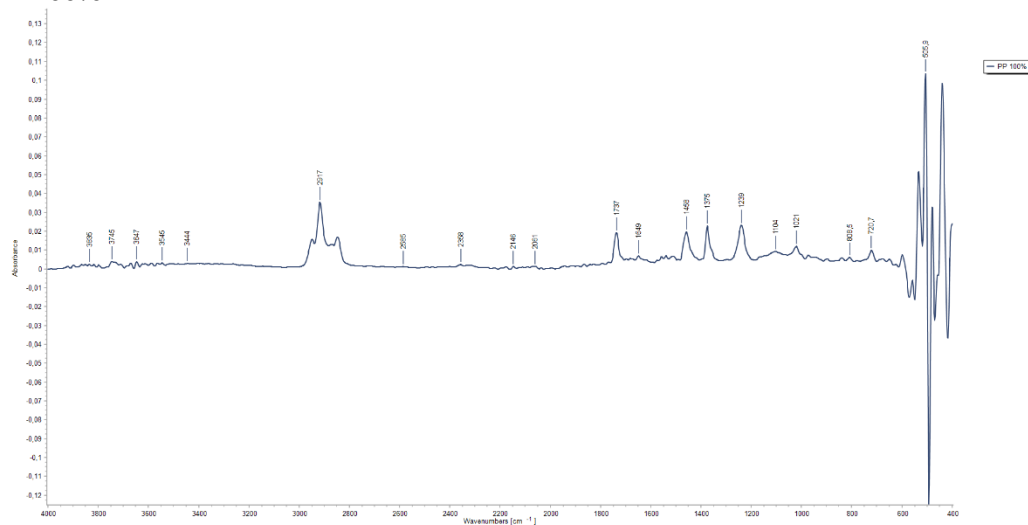


	F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
	0,0735	0,21315	0,06	20	243,9596676	84,12402333	1402,067055
	0,0588	0,17885	0,06	22	204,7017901	67,29921866	1121,653644
	0,0833	0,19845	0,06	20	227,134863	95,34055977	1589,009329
rata-rata	0,071866667	0,196816667	0,06	20,66666667	225,2654402	82,25460059	1370,91001
Deviasi	0,012331396	0,017208234	0	1,154700538	19,69559071	14,11383218	235,2305363

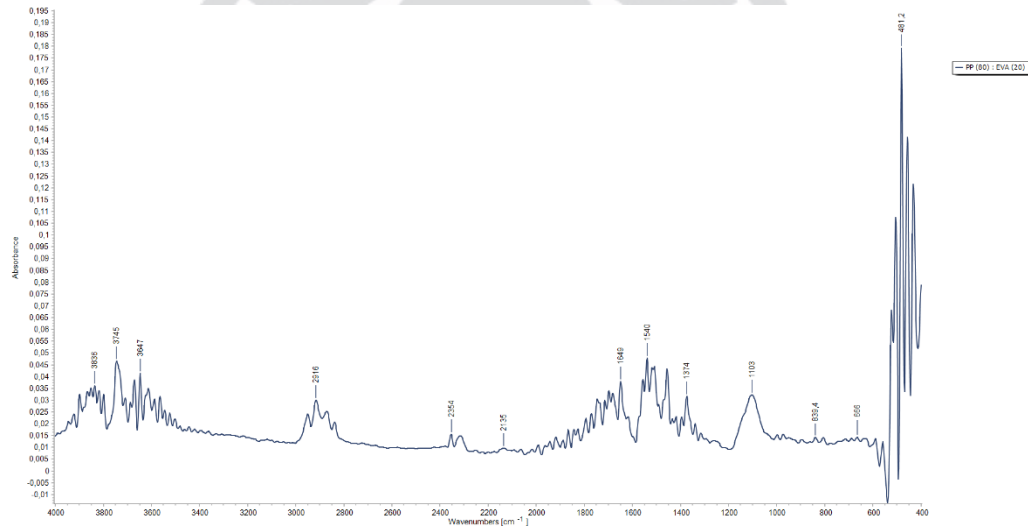


Lampiran 10 FTIR

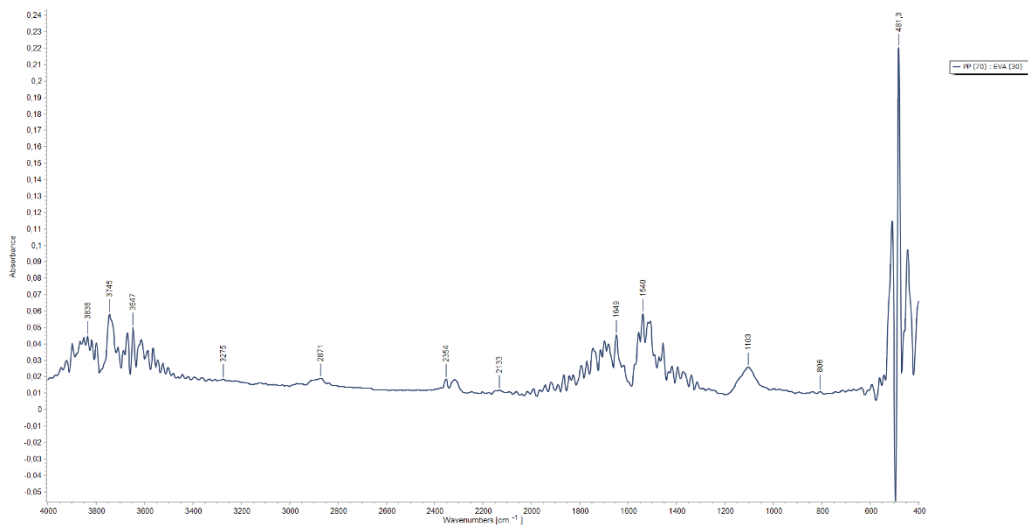
PP 100%



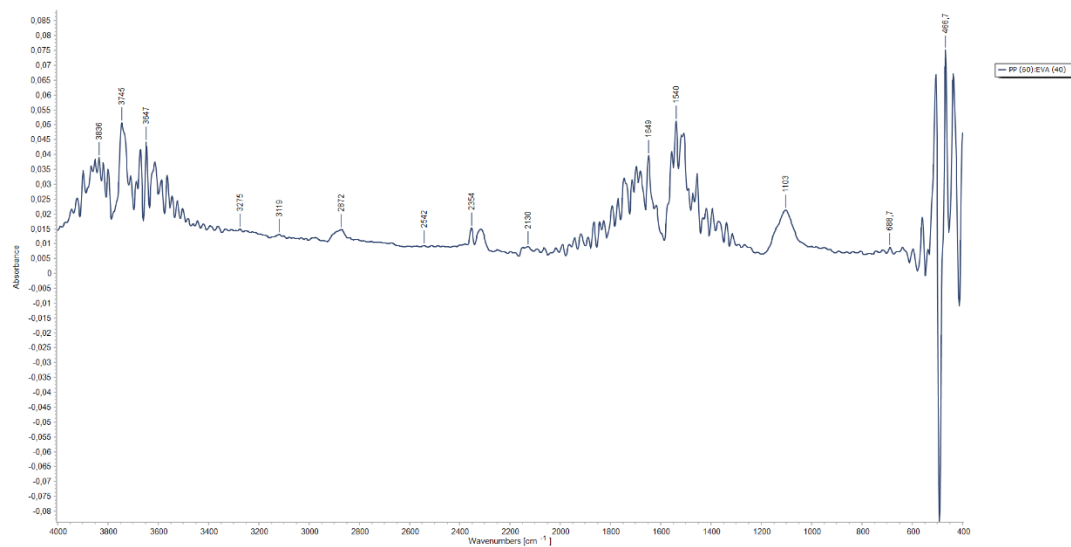
PP 80% EVA 20%



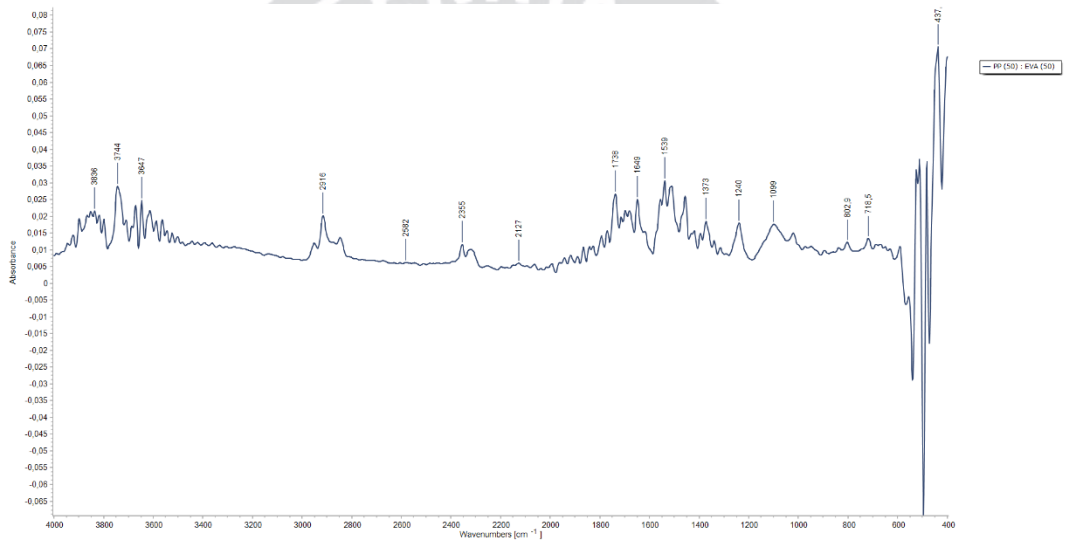
PP 70% EVA 30%



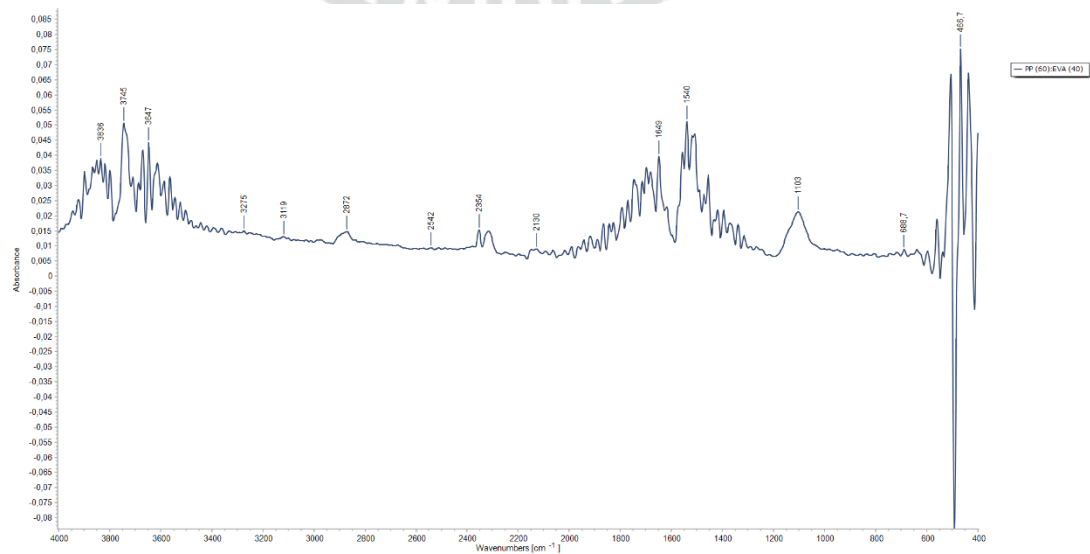
PP 60% EVA 40%



PP 50% EVA 50%

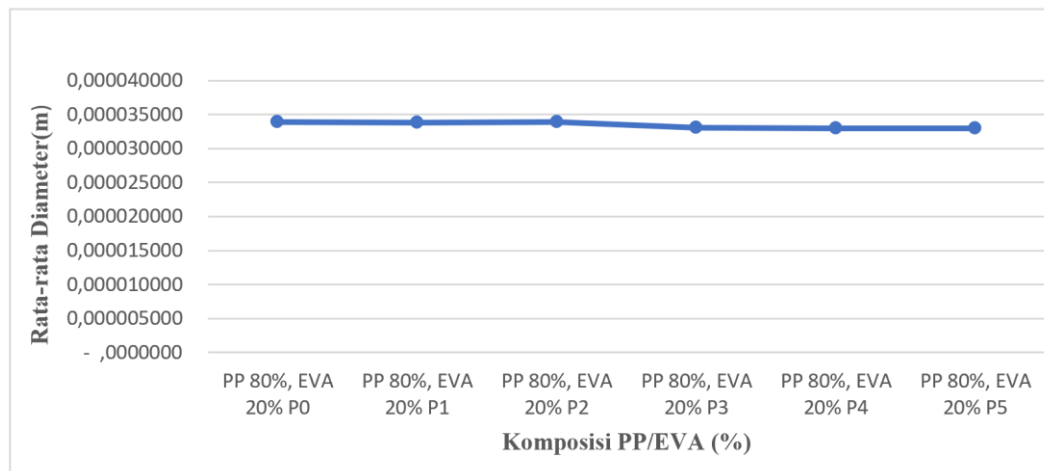


PP 40% EVA 60%



Lampiran 11 Hasil Mikroskop Optik dengan *Video analyzer*

Komposisi	Rata-rata Diameter (m)
PP 80%, EVA 20% P0	0,000033882
PP 80%, EVA 20% P1	0,000033830
PP 80%, EVA 20% P2	0,000033860
PP 80%, EVA 20% P3	0,000033076
PP 80%, EVA 20% P4	0,000032961
PP 80%, EVA 20% P5	0,000032950



Lampiran 12 Uji Nomor Benang PP/EVA Variasi *Draw Ratio* (SNI 2060:2010)

benang PP 80% : eva 20% P0: 300

nomor benang

No	Panjang (m)	Berat (g)	Denier	Tex
1	0,5	0,01606	289,08	32,12
2	0,5	0,01497	269,46	29,94
3	0,5	0,01379	248,22	27,58
4	0,5	0,01393	250,74	27,86
5	0,5	0,01478	266,04	29,56
6	0,5	0,01535	276,30	30,70
7	0,5	0,01625	292,50	32,50
8	0,5	0,01706	307,08	34,12
9	0,5	0,01608	289,44	32,16
10	0,5	0,01541	277,38	30,82
11	0,5	0,01576	283,68	31,52
12	0,5	0,01663	299,34	33,26
13	0,5	0,01656	298,08	33,12
14	0,5	0,01561	280,98	31,22
15	0,5	0,01580	284,40	31,60
16	0,5	0,01612	290,16	32,24
17	0,5	0,01669	300,42	33,38
18	0,5	0,01645	296,10	32,90
19	0,5	0,01575	283,50	31,50
20	0,5	0,01608	289,44	32,16
		rata-rata	283,62	31,51
		s	15,57	1,73
		cv	5,49	5,49

benang PP 80% : eva 20%

kekuatan tarik

No	Kek (gf)	mulur (mm)	mulur %)
1	1085	159,00	63,60
2	1005	142,00	56,80
3	1050	143,00	57,20
4	985	128,00	51,20
5	1050	178,00	71,20
6	1085	180,00	72,00
7	1010	184,00	73,60
8	1040	155,00	62,00
9	1050	145,00	58,00
10	1050	145,00	58,00
11	1005	129,00	51,60
12	1055	165,00	66,00
13	1035	155,00	62,00
14	1040	120,00	48,00
15	1015	170,00	68,00
16	1040	152,00	60,80
17	1025	202,00	80,80
18	995	154,00	61,60
19	1015	180,00	72,00
20	1000	174,00	69,60
rata-rata gf	1.031,75		63,20
s	27,92		8,46
cv	2,71		13,39
rata-rata cN	1.011,12		
Tenacity (g/Tex)	32,74		
Tenacity (g/Den)	3,64		
Tenacity (cN/Tex)	32,09		
Tenacity (cN/Den)	3,57		

benang P1: 310					benang P1: 310		
No	Panjang (m)	Berat (g)	Denier	Tex	No	Kek (gf)	mulur (%)
1	0,5	0,01730	311,40	34,60	1	1010	33,00
2	0,5	0,01765	317,70	35,30	2	1000	46,00
3	0,5	0,01708	307,44	34,16	3	999	42,00
4	0,5	0,01649	296,82	32,98	4	1040	37,40
5	0,5	0,01558	280,44	31,16	5	1020	36,00
6	0,5	0,01546	278,28	30,92	6	1040	36,00
7	0,5	0,01628	293,04	32,56	7	970	36,40
8	0,5	0,01665	299,70	33,30	8	1005	37,20
9	0,5	0,01568	282,24	31,36	9	1000	40,10
10	0,5	0,01508	271,44	30,16	10	1010	38,00
11	0,5	0,01512	272,16	30,24	11	960	24,80
12	0,5	0,01638	294,84	32,76	12	998	32,20
13	0,5	0,01568	282,24	31,36	13	1010	33,00
14	0,5	0,01571	282,78	31,42	14	1000	35,20
15	0,5	0,01598	287,64	31,96	15	1010	36,20
16	0,5	0,01621	291,78	32,42	16	975	37,40
17	0,5	0,01684	303,12	33,68	17	1000	33,80
18	0,5	0,01682	302,76	33,64	18	900	44,00
19	0,5	0,01650	297,00	33,00	19	950	35,00
20	0,5	0,01568	282,24	31,36	20	1000	40,00
		rata-rata	291,75	32,42	rata-rata	994,85	36,69
		s	12,89	1,43	s	31,73	4,57
		cv	4,42	4,42	cv	3,19	12,47
					rata-rata cN	974,95	
					Tenacity (g/Tex)	30,69	
					Tenacity (g/Den)	3,41	
					Tenacity (cN/Tex)	30,08	
					Tenacity (cN/Den)	3,34	

benang P2: 320					benang P2: 320		
No	Panjang (m)	Berat (g)	Denier	Tex	No	Kek (gf)	mulur %)
1	0,5	0,01293	232,74	25,86	1	750	28,00
2	0,5	0,01292	232,56	25,84	2	800	41,00
3	0,5	0,01233	221,94	24,66	3	770	29,00
4	0,5	0,01201	216,18	24,02	4	790	27,00
5	0,5	0,01224	220,32	24,48	5	760	28,20
6	0,5	0,01208	217,44	24,16	6	780	33,40
7	0,5	0,01160	208,80	23,20	7	760	30,00
8	0,5	0,01253	225,54	25,06	8	770	28,40
9	0,5	0,01308	235,44	26,16	9	775	30,20
10	0,5	0,01310	235,80	26,20	10	800	30,20
11	0,5	0,01357	244,26	27,14	11	760	28,40
12	0,5	0,01298	233,64	25,96	12	770	29,20
13	0,5	0,01171	210,78	23,42	13	770	37,20
14	0,5	0,01173	211,14	23,46	14	770	31,00
15	0,5	0,01218	219,24	24,36	15	770	37,80
16	0,5	0,01237	222,66	24,74	16	745	27,80
17	0,5	0,01290	232,20	25,80	17	765	40,00
18	0,5	0,01220	219,60	24,40	18	760	29,00
19	0,5	0,01300	234,00	26,00	19	730	35,00
20	0,5	0,01171	210,78	23,42	20	740	30,00
		rata-rata	224,25	24,92	rata-rata	766,75	31,54
		s	10,27	1,14	s	17,86	4,31
		cv	4,58	4,58	cv	2,33	13,66
					rata-rata cN	751,42	
					Tenacity (g/Tex)	30,77	
					Tenacity (g/Den)	3,42	
					Tenacity (cN/Tex)	30,16	
					Tenacity (cN/Den)	3,35	

benang P3: 330					benang P3: 330		
No	Panjang (m)	Berat (g)	Denier	Tex	No	Kek (gf)	mulur (%)
1	0,5	0,01393	250,74	27,86	1	805	29,70
2	0,5	0,01356	244,08	27,12	2	880	22,40
3	0,5	0,01502	270,36	30,04	3	850	28,00
4	0,5	0,01388	249,84	27,76	4	880	30,00
5	0,5	0,01372	246,96	27,44	5	865	24,20
6	0,5	0,01483	266,94	29,66	6	930	32,00
7	0,5	0,01547	278,46	30,94	7	950	28,40
8	0,5	0,01496	269,28	29,92	8	900	25,60
9	0,5	0,01535	276,30	30,70	9	920	26,40
10	0,5	0,01376	247,68	27,52	10	878	27,00
11	0,5	0,01545	278,10	30,90	11	880	26,20
12	0,5	0,01531	275,58	30,62	12	840	36,60
13	0,5	0,01445	260,10	28,90	13	970	34,00
14	0,5	0,01365	245,70	27,30	14	950	28,20
15	0,5	0,01384	249,12	27,68	15	870	38,00
16	0,5	0,01468	264,24	29,36	16	860	31,60
17	0,5	0,01451	261,18	29,02	17	900	34,20
18	0,5	0,01322	237,96	26,44	18	810	30,00
19	0,5	0,01335	240,30	26,70	19	860	32,20
20	0,5	0,01503	270,54	30,06	20	825	38,20
		rata-rata	259,17	28,80	rata-rata	881,15	30,15
		s	13,56	1,51	s	45,86	4,45
		cv	5,23	5,23	cv	5,20	14,77
					rata-rata cN	863,53	
					Tenacity (g/Tex)	30,60	
					Tenacity (g/Den)	3,40	
					Tenacity (cN/Tex)	29,99	
					Tenacity (cN/Den)	3,33	

benang P4: 340					benang P4: 340		
No	Panjang (m)	Berat (g)	Denier	Tex	No	Kek (gf)	mulur %)
1	0,5	0,00998	179,64	19,96	1	730	27,40
2	0,5	0,00978	176,04	19,56	2	650	29,60
3	0,5	0,00970	174,60	19,40	3	560	30,20
4	0,5	0,00999	179,82	19,98	4	540	28,00
5	0,5	0,00954	171,72	19,08	5	730	26,40
6	0,5	0,00931	167,58	18,62	6	410	24,40
7	0,5	0,00964	173,52	19,28	7	480	28,00
8	0,5	0,00985	177,30	19,70	8	470	25,00
9	0,5	0,00973	175,14	19,46	9	700	28,00
10	0,5	0,00954	171,72	19,08	10	400	26,20
11	0,5	0,00882	158,76	17,64	11	420	28,40
12	0,5	0,00834	150,12	16,68	12	498	25,20
13	0,5	0,00954	171,72	19,08	13	420	30,00
14	0,5	0,00939	169,02	18,78	14	560	28,20
15	0,5	0,00995	179,10	19,90	15	610	26,00
16	0,5	0,01078	194,04	21,56	16	680	24,40
17	0,5	0,00965	173,70	19,30	17	710	26,20
18	0,5	0,00944	169,92	18,88	18	700	22,40
19	0,5	0,00962	173,16	19,24	19	480	28,20
20	0,5	0,00974	175,32	19,48	20	480	30,00
		rata-rata	173,10	19,23	rata-rata	561,40	27,11
		s	8,58	0,95	s	117,72	2,14
		cv	4,95	4,95	cv	20,97	7,91
					rata-rata cN	550,17	
					Tenacity (g/Tex)	29,19	
					Tenacity (g/Den)	3,24	
					Tenacity (cN/Tex)	28,61	
					Tenacity (cN/Den)	3,18	

benang P5: 350

nomor benang

No	Panjang (m)	Berat (g)	Denier	Tex
1	0,5	0,00524	94,32	10,48
2	0,5	0,00558	100,44	11,16
3	0,5	0,00581	104,58	11,62
4	0,5	0,00610	109,80	12,20
5	0,5	0,00526	94,68	10,52
6	0,5	0,00544	97,92	10,88
7	0,5	0,00640	115,20	12,80
8	0,5	0,00608	109,44	12,16
9	0,5	0,00525	94,50	10,50
10	0,5	0,00512	92,16	10,24
11	0,5	0,00550	99,00	11,00
12	0,5	0,00682	122,76	13,64
13	0,5	0,00531	95,58	10,62
14	0,5	0,00622	111,96	12,44
15	0,5	0,00569	102,42	11,38
16	0,5	0,00548	98,64	10,96
17	0,5	0,00512	92,16	10,24
18	0,5	0,00580	104,40	11,60
19	0,5	0,00615	110,70	12,30
20	0,5	0,00585	105,30	11,70
		rata-rata	102,80	11,42
		s	8,43	0,94
		cv	8,20	8,20

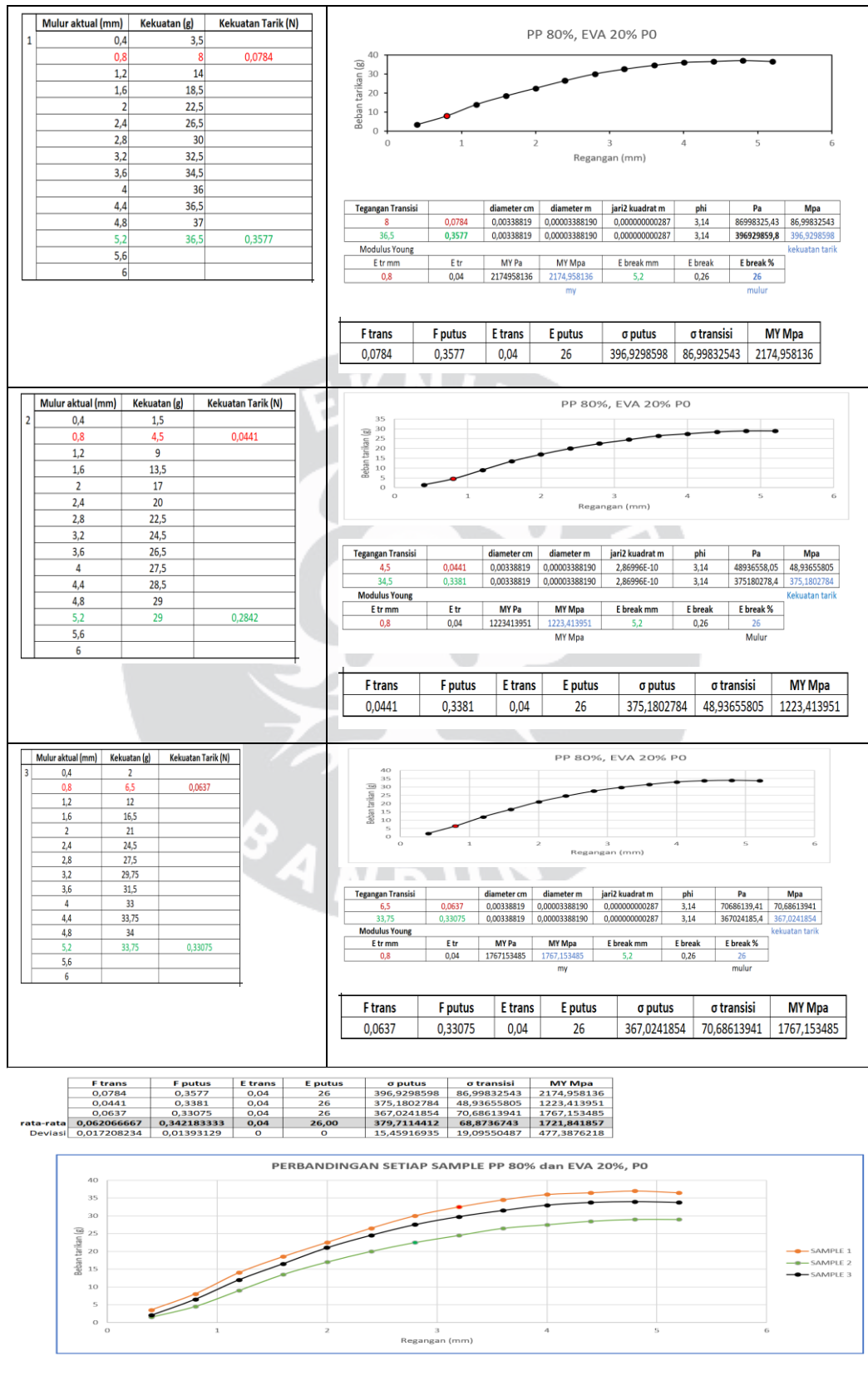
benang P5: 350

kekuatan tarik

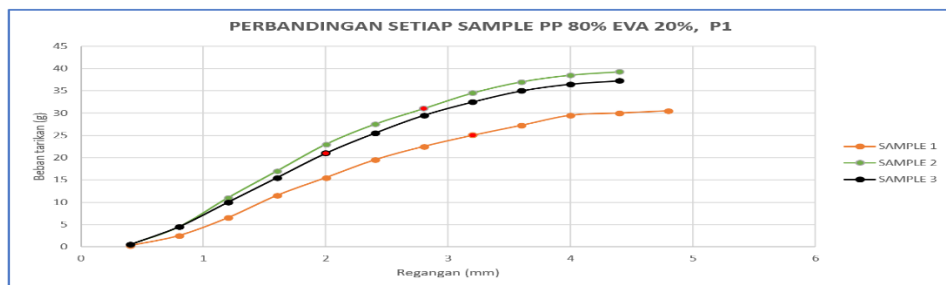
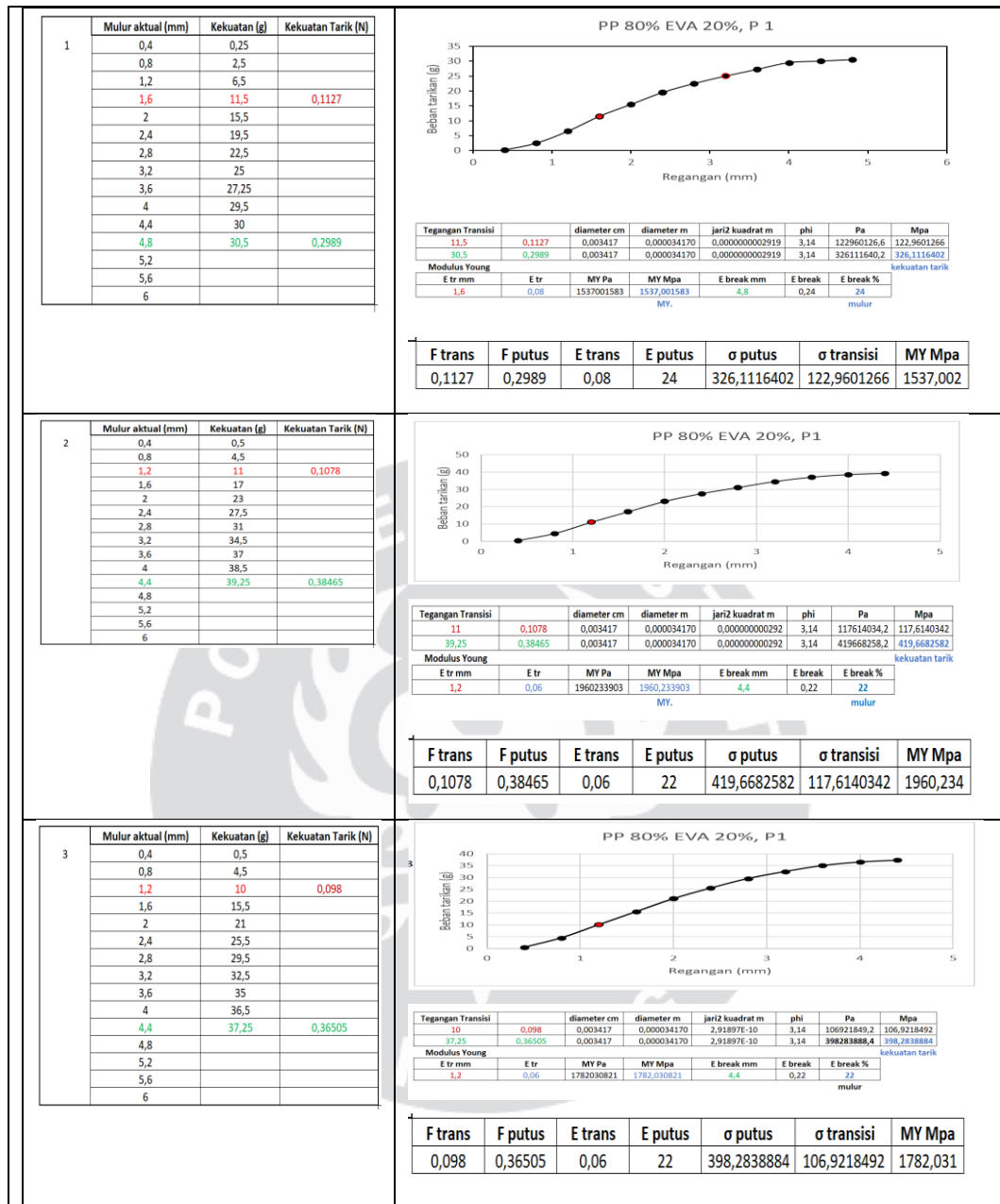
No	Kek (gf)	mulur (%)
1	320	20,00
2	300	24,80
3	310	26,20
4	340	20,00
5	315	24,20
6	355	20,20
7	340	24,00
8	336	20,60
9	370	21,60
10	310	22,00
11	340	23,20
12	310	20,20
13	300	20,00
14	310	22,20
15	345	24,20
16	360	22,20
17	310	23,00
18	300	24,00
19	310	20,00
20	335	20,20
rata-rata	325,80	22,14
s	21,50	1,96
cv	6,60	8,86
rata-rata cN	319,28	
Tenacity (g/Tex)	28,52	
Tenacity (g/Den)	3,17	
Tenacity (cN/Tex)	27,95	
Tenacity (cN/Den)	3,11	

Lampiran 13 Uji Kekuatan Tarik, Mulur dan Modulus Young

PP80%EVA20%, P0 (SNI7650:2010)



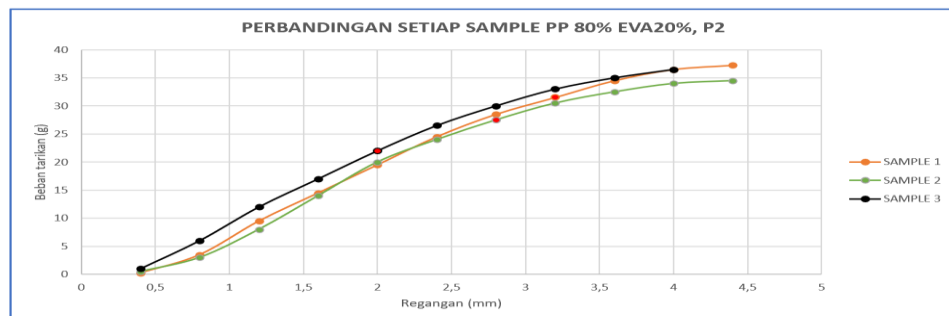
Uji kekuatan Tarik, Mulur dan modulus Young PP 80% EVA 20%, P1



Uji kekuatan Tarik, Mulur dan modulus Young PP 80% EVA 20%, P2



	F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
	0,0931	0,36505	0,06	22	409,3796464	104,4055474	1740,092
	0,1372	0,3381	0,08	22	379,156988	153,8608067	1923,26
	0,0588	0,3577	0,04	20	401,1371032	65,94034574	1648,509
rata-rata	0,096367	0,353617	0,06	21,33	396,5579126	108,0689	1770,62
Deviasi	0,039302	0,013931	0,02	1,15470054	15,62302825	44,07456158	139,8966



Uji kekuatan Tarik, Mulur dan modulus Young PP 80% EVA 20%, P3

1	Mulur aktual (mm)	Kekuatan (g)	Kekuatan Tarik (N)
	0,4	0,25	
	0,8	2,25	
	1,2	6,5	
	1,6	10,5	
	2	14,5	0,1421
	2,4	17,5	
	2,8	20,25	
	3,2	22,5	
	3,6	24,5	
	4	26,25	
	4,4	27	
	4,8	27,75	
	5,2	28,25	0,27685
	5,6		
	6		

Tegangan Transisi	diameter cm	diameter m	jari2 kuadrat m	phi	Pa	Mpa
14,5	0,1421	0,003330429	3,33043E-05	2,77294E-10	3,14	163201510,4
27	0,2646	0,003330429	3,33043E-05	2,77294E-10	3,14	303892467,7

Modulus Young	E tr mm	E tr	MY Pa	MY Mpa	E break mm	E break	E break %
2	0,1	1632015104	1632,015104	MY,	5,2	0,26	26

F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
0,1421	0,2646	0,1	26	303,8924677	163,2015104	1632,015

 2 | Mulur aktual (mm) | Kekuatan (g) | Kekuatan Tarik (N) || | 0,4 | 0,25 | |
	0,8	5	
	1,2	9	
	1,6	14,5	0,1421
	2	21	
	2,4	27	
	2,8	32	
	3,2	36	
	3,6	38	
	4	41,5	
	4,4	42,5	
	4,8	43	0,4214
	5,2		
	5,6		
	6		

Tegangan Transisi	diameter cm	diameter m	jari2 kuadrat m	phi	Pa	Mpa
14,5	0,1421	0,003330429	3,33043E-05	2,77294E-10	3,14	163201510,4
43	0,4214	0,003330429	3,33043E-05	2,77294E-10	3,14	483976893

Modulus Young	E tr mm	E tr	MY Pa	MY Mpa	E break mm	E break	E break %
1,6	0,08	2040018880	2040,01888	MY,	4,8	0,24	24

F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
0,1421	0,4214	0,08	24	483,976893	163,2015104	2040,019

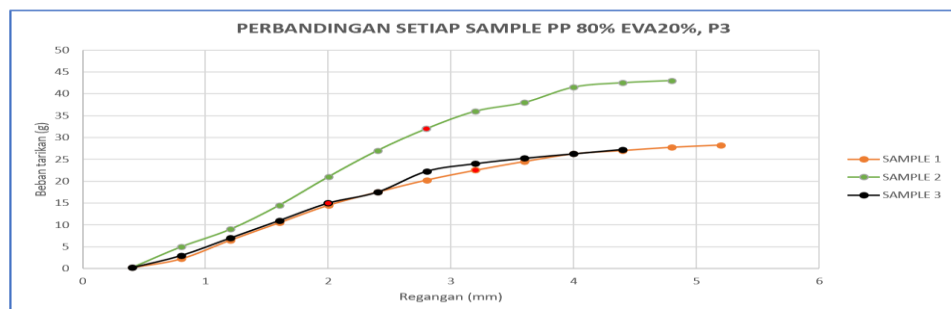
 3 | Mulur aktual (mm) | Kekuatan (g) | Kekuatan Tarik (N) || | 0,4 | 0,25 | |
	0,8	3	
	1,2	7	
	1,6	11	
	2	15	0,147
	2,4	17,5	
	2,8	22,25	
	3,2	24	
	3,6	25,25	
	4	26,25	
	4,4	27,25	0,26705
	4,8		
	5,2		
	5,6		
	6		

Tegangan Transisi	diameter cm	diameter m	jari2 kuadrat m	phi	Pa	Mpa
15	0,147	0,003330429	3,33043E-05	2,77294E-10	3,14	168829148,7
27,25	0,26705	0,003330429	3,33043E-05	2,77294E-10	3,14	306706286,9

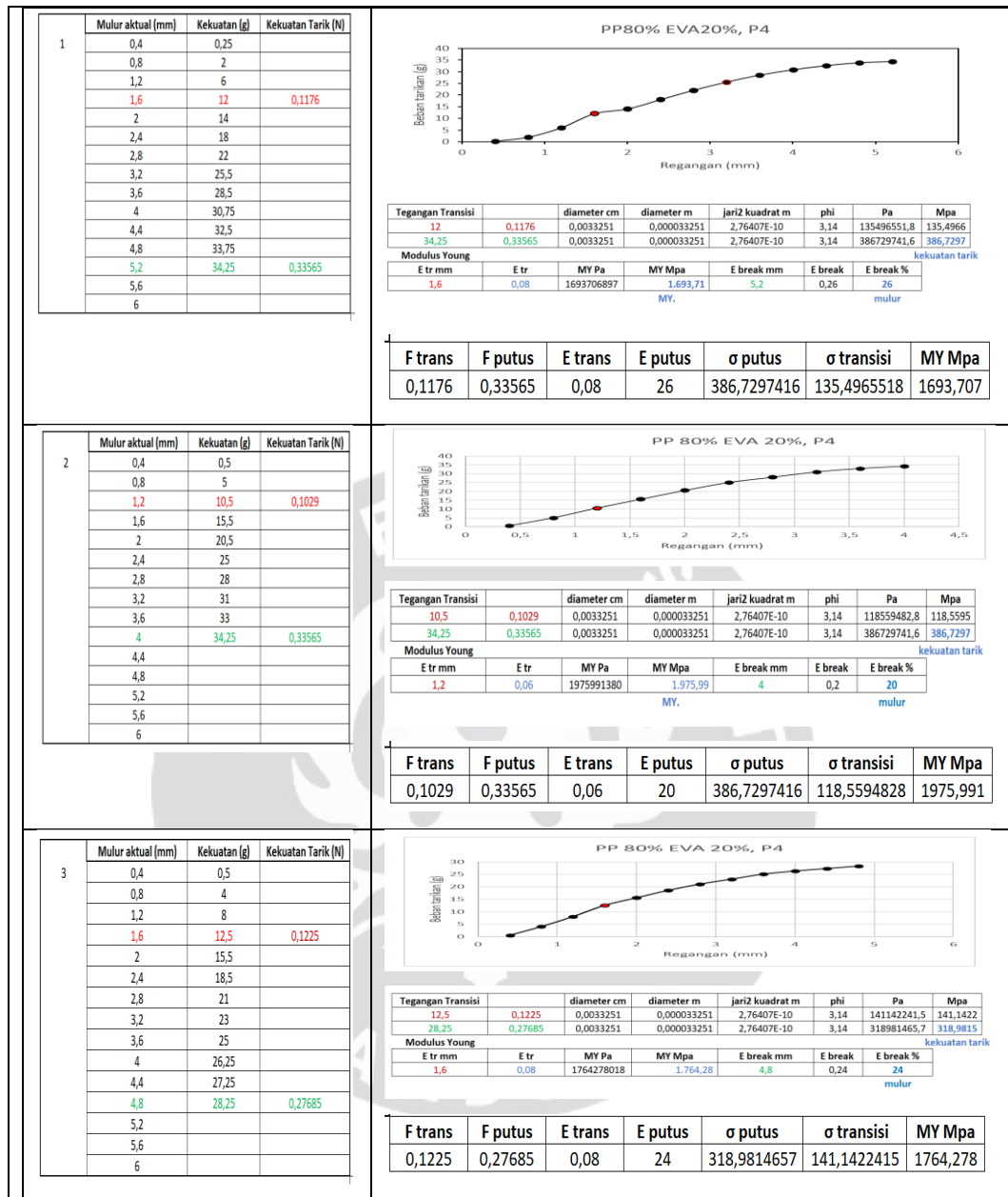
Modulus Young	E tr mm	E tr	MY Pa	MY Mpa	E break mm	E break	E break %
2	0,1	1688291487	1688,291487		4,4	0,22	22

F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
0,147	0,26705	0,1	22	306,7062869	168,8291487	1688,291

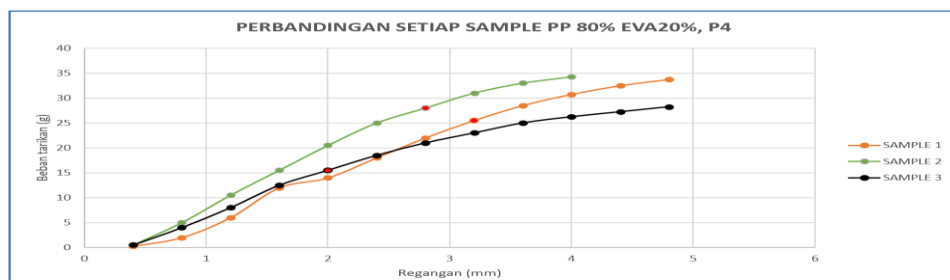
F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
0,1421	0,2646	0,1	26	303,8924677	163,2015104	1632,015
0,1421	0,4214	0,08	24	483,976893	163,2015104	2040,019
0,147	0,26705	0,1	22	306,7062869	168,8291487	1688,291
0,143733	0,317683	0,093333	24,00	364,8585492	165,0773899	1786,775
Deviasi	0,002829	0,08983	0,011547	2	103,1691052	3,249118482



Uji kekuatan Tarik, Mulur dan modulus Young PP 80% EVA 20%, P4



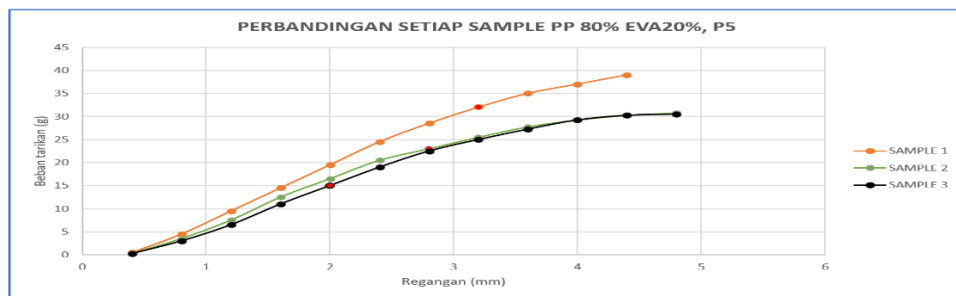
	F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
	0,1176	0,33565	0,08	26	386,7297416	135,4965518	1693,707
	0,1029	0,33565	0,06	20	386,7297416	118,5594828	1975,991
	0,1225	0,27685	0,08	24	318,9814657	141,1422415	1764,278
rata-rata	0,114333	0,31605	0,073333	23,33	364,1469829	131,7327587	1811,325
Deviasi	0,0102	0,033948	0,011547	3,05505	39,11448533	11,7524402	146,9055



Uji kekuatan Tarik, Mulur dan modulus Young PP 80% EVA 20%, P5



	F trans	F putus	E trans	E putus	σ putus	σ transisi	MY Mpa
	0,2401	0,3822	0,12	22	437,8282357	275,0459429	2292,05
	0,1225	0,30135	0,08	24	345,2107243	140,3295627	1754,12
	0,1078	0,2989	0,08	24	342,404133	123,4900152	1543,625
rata-rata	0,1568	0,327483	0,0933333	23,33333	375,1476977	179,6218403	1863,265
Deviasi	0,072513	0,047402	0,023094	1,154701	54,30107387	83,0675154	385,9654



Lampiran 14 Jumlah Jeratan Kain Rajut

No	Wale Per Inch (WPI)			Course Per Inch (CPI)		
	x	(x-x)	(x-x) ²	x	(x-x)	(x-x) ²
1	37	0	0	37	0	0
2	37	0	0	37	0	0
3	37	0	0	37	0	0
4	37	0	0	37	0	0
5	37	0	0	37	0	0
jumlah	185		0	185		0
rata-rata / inci	37			37		
jeratan per cm	14.57			14.57		
standar deviasi			0			0
koefisien variasi			0			0

