

# ภาคผนวก ก

ผลการทดสอบการต้านทานต่อแรงดึง

ตารางผลการทดสอบชิ้นงาน ดั้มเบล

สูตรที่ 1	STR5L	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	0 phr sample							
	1	119.7	119.7	18.64	446.6	3.10	6	1.070
2	109.6	109.6	17.23	442.5	2.84	6	1.060	
3	125.4	125.4	19.62	444.8	3.06	6	1.065	
4	129.5	129.5	19.89	495.3	2.93	6	1.085	
5	121.2	121.2	18.70	446.6	3.07	6	1.080	
Mean	121.1	121.1	18.8	455.2	3.00	6.0	1.072	
Standard	7.47	7.47	1.04	22.50	0.11	0.00	0.010	

สูตรที่ 2	d50=0.5	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	10 phr sample							
	1	162.9	162.9	24.35	472.3	3.39	6	1.115
2	130.5	130.5	19.77	456.2	3.42	6	1.100	
3	134.7	134.7	20.79	456.1	3.27	6	1.080	
4	123.6	123.6	18.90	450.1	3.30	6	1.090	
5	121.2	121.2	18.36	444.8	3.32	6	1.100	
Mean	134.6	134.6	20.4	455.9	3.34	6.0	1.097	
Standard	16.72	16.72	2.37	10.32	0.06	0.00	0.013	

สูตรที่ 3	d50=0.5	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	12.5 phr sample							
	1	145.4	145.4	22.44	488	3.14	6	1.080
2	268.7	138.4	21.76	479.9	3.22	6	1.060	
3	151.7	151.7	23.85	499.4	3.17	6	1.060	
4	268.5	157.5	25.49	507.5	3.14	6	1.030	
5	178.6	178.6	24.02	498.5	3.16	6	1.030	
Mean	202.6	154.3	23.5	494.7	3.16	6.0	1.052	
Standard	61.54	15.33	1.46	10.77	0.03	0.00	0.022	

สูตรที่ 4	d50=0.5	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	15 phr sample							
	1	269.1	148.1	23.96	461.8	3.75	6	1.030
2	269.2	149.1	24.36	481.8	3.66	6	1.020	
3	147.5	147.5	22.98	465.7	3.70	6	1.070	
4	268.9	155.6	24.70	471.1	3.69	6	1.050	
5	146.9	146.9	23.54	464.8	3.66	6	1.040	
Mean	220.3	149.4	23.9	469.0	3.69	6.0	1.042	
Standard	66.75	3.54	0.68	7.88	0.04	0.00	0.019	

สูตรที่ 5	d50=0.5	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	20 phr sample							
	1	155.4	155.4	23.55	492.7	3.96	6	1.100
2	151.7	151.7	23.41	457.2	3.91	6	1.080	
3	142.7	142.7	22.65	451	3.92	6	1.050	
4	148.4	148.4	22.48	450.3	3.90	6	1.100	
5	155	155	24.37	475.3	3.80	6	1.060	
Mean	150.6	150.6	23.3	465.3	3.90	6.0	1.078	
Standard	5.26	5.26	0.76	18.34	0.06	0.00	0.023	

ตารางผลการทดสอบชิ้นงาน ดั้มเบล (ต่อ)

สูตรที่ 6	d50=0.5	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	25 phr sample							
	1	127.6	147.6	23.21	275.2	4.14	6	1.060
2	128.7	143.7	22.59	429.3	3.95	6	1.060	
3	135.4	149.4	23.94	439.6	4.08	6	1.040	
4	268.9	141.2	22.41	440.5	4.02	6	1.050	
5	268.6	146.1	23.87	423	4.16	6	1.020	
Mean	185.8	145.6	23.2	401.5	4.07	6.0	1.046	
Standard	75.75	3.23	0.71	70.99	0.09	0.00	0.017	

สูตรที่ 7	d50=0.5	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	30 phr sample							
	1	153.1	153.1	24.07	463	3.99	6	1.060
2	148.8	148.8	22.96	451.6	4.29	6	1.080	
3	154.6	154.6	23.42	458.2	4.26	6	1.100	
4	147.8	147.8	22.81	461.6	4.12	6	1.080	
5	161.6	161.6	24.48	496.2	4.01	6	1.100	
Mean	153.2	153.2	23.6	466.1	4.13	6.0	1.084	
Standard	5.50	5.50	0.72	17.38	0.14	0.00	0.017	

สูตรที่ 8	STR5L	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	40 phr sample							
	1	144.8	144.8	21.94	474.7	4.08	6	1.100
2	151.1	151.1	22.89	484.5	4.11	6	1.100	
3	161.7	161.7	24.50	481.5	4.32	6	1.100	
4	146.3	146.3	23.00	469.5	4.28	6	1.060	
5	160.5	160.5	24.54	475.2	4.29	6	1.090	
Mean	152.9	152.9	23.4	477.1	4.21	6.0	1.090	
Standard	7.87	7.87	1.12	5.94	0.11	0.00	0.017	

สูตรที่ 9	STR5L	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	50 phr sample							
	1	145.9	145.9	22.31	442.5	4.86	6	1.090
2	153.3	153.3	23.23	453.4	4.85	6	1.100	
3	155.7	155.7	23.59	453.3	4.95	6	1.100	
4	142.7	142.7	21.62	431.7	4.80	6	1.100	
5	143.8	143.8	21.99	432.9	4.95	6	1.090	
Mean	148.3	148.3	22.5	442.8	4.88	6.0	1.096	
Standard	5.86	5.86	0.83	10.53	0.07	0.00	0.01	

สูตรที่ 10	beaker	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	15 phr sample							
	1	268.5	137.3	20.99	490.9	2.89	6	1.090
2	141.4	141.4	21.42	487.2	2.90	6	1.100	
3	268.6	132.1	19.48	486.6	2.86	6	1.130	
4	143.2	143.2	21.12	484.2	3.08	6	1.130	
5	119	119	19.26	471.8	3.02	6	1.030	
Mean	188.1	134.6	20.5	484.1	2.95	6.0	1.096	
Standard	74.02	9.71	1.01	7.30	0.09	0.00	0.041	

ตาราง ผลการทดสอบชิ้นงาน ดั้มเบล (ต่อ)

สูตรที่ 11	Microcal	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	10 phr sample							
	1	123.2	123.2	19.56	439.6	3.03	6	1.050
	2	269.1	121.4	19.27	261.1	3.14	6	1.050
	3	145.3	145.3	22.22	272.5	3.15	6	1.090
	4	137.3	137.3	21.39	267.2	3.08	6	1.070
	5	118.8	118.8	18.50	441.1	3.08	6	1.070
	Mean	158.7	129.2	20.2	336.3	3.10	6.0	1.066
	Standard	62.61	11.51	1.55	95.07	0.05	0.00	0.017

สูตรที่ 12	Microcal	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	15 phr sample							
	1	127.5	127.5	20.24	466.2	3.12	6	1.050
	2	120	120	19.61	466.2	3.24	6	1.020
	3	269.2	135.7	20.94	463.7	3.28	6	1.080
	4	268.7	129.4	21.57	455.9	3.19	6	1.000
	5	136.7	136.7	21.70	462.3	3.26	6	1.050
	Mean	184.4	129.9	20.8	462.9	3.22	6.0	1.040
	Standard	77.39	6.78	0.89	4.24	0.06	0.00	0.031

สูตรที่ 13	Microcal	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	20 phr sample							
	1	143.2	143.2	22.73	470.4	3.28	6	1.050
	2	121.2	121.2	18.36	431.2	3.21	6	1.100
	3	131.6	131.1	21.01	459.1	3.22	6	1.040
	4	269.1	118.6	19.57	448	3.16	6	1.010
	5	269	128.3	21.38	457.4	3.22	6	1.000
	Mean	186.8	128.5	20.6	453.2	3.22	6.0	1.040
	Standard	75.47	9.67	1.69	14.66	0.04	0.00	0.039

สูตรที่ 14	Microcal	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	25 phr sample							
	1	131.5	131.5	20.87	484.2	3.37	6	1.050
	2	126.7	126.1	20.60	481.9	3.20	6	1.020
	3	132.9	132.9	21.30	475.3	3.22	6	1.040
	4	268.6	123.7	20.41	475.6	3.40	6	1.010
	5	122.2	122.2	20.37	471.5	3.51	6	1.000
	Mean	156.4	127.3	20.7	477.7	3.34	6.0	1.024
	Standard	62.87	4.73	0.38	5.21	0.13	0.00	0.021

สูตรที่ 15	Microcal	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	30 phr sample							
	1	126.9	126.9	20.14	444.7	3.44	6	1.050
	2	124.4	124.4	19.94	444	3.48	6	1.040
	3	118.9	118.9	18.87	433.5	3.51	6	1.050
	4	127.5	127.5	20.05	446.6	3.31	6	1.060
	5	118.7	118.7	19.21	405.7	3.27	6	1.030
	Mean	123.3	123.3	19.6	434.9	3.40	6.0	1.046
	Standard	4.25	4.25	0.57	17.11	0.11	0.00	0.011

ตารางผลการทดสอบชิ้นงาน ดัมเบล (ต่อ)

สูตรที่ 16	Thurboplex 10 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	130.9	130.9	20.20	443.1	3.20	6	1.080
2	145.7	145.7	23.81	472.7	3.24	6	1.020	
3	134.6	134.6	21.16	443.9	3.25	6	1.060	
4	156.1	156.1	24.31	463.9	3.24	6	1.070	
5	268.5	130.8	20.76	435.5	3.27	6	1.050	
Mean	167.2	139.6	22.0	451.8	3.24	6.0	1.056	
Standard	57.51	11.04	1.88	15.71	0.03	0.00	0.023	

สูตรที่ 17	Thurboplex 15 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	133.8	133.8	21.44	441.6	3.42	6	1.040
2	122.5	122.5	19.44	429.8	3.41	6	1.050	
3	119.2	119.2	19.29	428.8	3.39	6	1.030	
4	121.8	121.8	19.33	425.4	3.41	6	1.050	
5	122.1	124.3	19.36	426.2	3.31	6	1.070	
Mean	123.9	124.3	19.8	430.4	3.39	6.0	1.048	
Standard	5.69	5.61	0.93	6.54	0.05	0.00	0.015	

สูตรที่ 18	Thurboplex 20 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	113.2	113.2	18.14	320.8	3.25	6	1.040
2	118.1	118.1	19.30	426.4	3.45	6	1.020	
3	268.9	133.4	21.17	446.7	3.37	6	1.050	
4	112.7	112.7	17.89	433	3.32	6	1.050	
5	110.8	110.8	17.26	410.9	3.39	6	1.070	
Mean	144.7	117.6	18.8	407.6	3.36	6.0	1.046	
Standard	69.46	9.21	1.54	50.18	0.07	0.00	0.018	

สูตรที่ 19	Thurboplex 25 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	109.7	109.7	17.75	418.7	3.41	6	1.030
2	107.6	107.6	16.92	387.7	3.47	6	1.060	
3	106.7	106.7	17.27	406.6	3.39	6	1.030	
4	112	108.5	17.56	419.6	3.45	6	1.030	
5	268.5	131.9	20.17	438.5	3.45	6	1.090	
Mean	140.9	112.9	17.9	414.2	3.44	6.0	1.048	
Standard	71.36	10.69	1.29	18.71	0.03	0.00	0.027	

สูตรที่ 20	Thurboplex 30 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	116.7	116.7	18.01	295	3.60	6	1.080
2	112.2	112.2	17.81	394.3	3.61	6	1.050	
3	268.2	115.3	17.96	407.3	3.62	6	1.070	
4	118.6	118.6	18.30	280.7	3.49	6	1.080	
5	111.8	111.8	17.58	419.4	3.44	6	1.060	
Mean	145.5	114.9	17.9	359.3	3.55	6.0	1.068	
Standard	68.65	2.91	0.27	66.06	0.08	0.00	0.013	

ตาราง ผลการทดสอบชิ้นงาน ดัมเบล (ต่อ)

สูตรที่ 21	stearic 10 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	268.6	141.3	22.64	493.4	2.95	6	1.040
2	268.8	155.1	23.94	510.3	2.90	6	1.080	
3	154	154	23.77	508.5	2.94	6	1.080	
4	268.4	133.4	20.59	489.3	2.90	6	1.080	
5	154.3	154.3	23.17	497.4	2.92	6	1.110	
Mean	222.8	147.6	22.8	499.8	2.92	6.0	1.078	
Standard	62.69	9.79	1.35	9.26	0.02	0.00	0.025	

สูตรที่ 22	stearic 15 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	142.5	142.5	21.99	507.3	2.93	6	1.080
2	268.6	152.8	23.80	511.9	2.96	6	1.070	
3	145.8	145.8	22.50	512.2	2.91	6	1.080	
4	153	153	23.83	517.2	2.94	6	1.070	
5	269	146	22.74	503.8	3.01	6	1.070	
Mean	195.8	148.0	23.0	510.5	2.95	6.0	1.074	
Standard	66.77	4.67	0.82	5.12	0.04	0.00	0.005	

สูตรที่ 23	stearic 20 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	268.8	136.3	22.06	495.9	3.07	6	1.030
2	268.8	130.2	21.70	491.3	3.22	6	1.000	
3	146.6	146.6	23.05	497.5	3.08	6	1.060	
4	129.89	129.89	20.23	428.6	3.17	6	1.070	
5	130.9	130.9	19.83	471.2	3.13	6	1.100	
Mean	189.0	134.8	21.4	476.9	3.13	6.0	1.052	
Standard	73.15	7.11	1.33	28.97	0.06	0.00	0.038	

สูตรที่ 24	stearic 25 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	268.3	122.8	19.49	444.8	3.34	6	1.050
2	144.5	144.5	22.30	488	3.27	6	1.080	
3	136.8	136.8	21.92	474	3.33	6	1.040	
4	145.4	145.4	22.44	467.2	3.42	6	1.080	
5	139.2	139.2	21.09	460.4	3.40	6	1.100	
Mean	166.8	137.7	21.4	466.9	3.35	6.0	1.070	
Standard	56.83	9.09	1.21	16.02	0.06	0.00	0.024	

สูตรที่ 25	stearic 30 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	141.6	141.6	21.85	476.6	3.42	6	1.080
2	269	144.3	22.90	475.8	3.57	6	1.050	
3	268.4	139.2	21.09	463.6	3.54	6	1.100	
4	268.6	147.3	21.54	472.4	3.51	6	1.140	
5	268.6	147.3	21.54	472.4	3.53	6	1.140	
Mean	243.2	143.9	21.8	472.2	3.51	6.0	1.102	
Standard	56.82	3.56	0.68	5.16	0.06	0.00	0.039	

ตารางผลการทดสอบชิ้นงาน คัมเบล (ต่อ)

สูตรที่ 26	Stirrer PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	10 phr sample							
	1	97.53	97.53	14.91	450.7	3.19	6	1.090
	2	87.26	87.26	13.34	362.7	3.20	6	1.090
	3	86.29	86.29	13.32	399.2	3.07	6	1.080
	4	92.39	92.39	14.53	404.6	3.16	6	1.060
	5	95.28	95.28	14.70	409.5	3.17	6	1.080
Mean	91.8	91.8	14.2	405.3	3.16	6.0	1.080	
Standard	4.91	4.91	0.77	31.35	0.05	0.00	0.012	

สูตรที่ 27	Stirrer PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	15 phr sample							
	1	80.64	80.64	12.22	387.3	3.12	6	1.100
	2	103.8	103.8	15.87	418.1	3.16	6	1.090
	3	104.2	104.2	15.37	412.3	3.23	6	1.130
	4	97.92	97.92	14.97	401.3	3.09	6	1.090
	5	93.65	93.65	13.57	395.6	2.98	6	1.150
Mean	96.0	96.0	14.4	402.9	3.12	6.0	1.112	
Standard	9.66	9.66	1.49	12.44	0.09	0.00	0.027	

สูตรที่ 28	Stirrer PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	20 phr sample							
	1	120.9	120.9	17.83	442.7	3.22	6	1.130
	2	120.8	120.8	18.47	451.2	3.16	6	1.090
	3	122.5	122.5	18.39	433.8	3.33	6	1.110
	4	119.2	119.2	18.40	440.5	3.28	6	1.080
	5	120.6	120.6	17.95	443	3.03	6	1.120
Mean	120.8	120.8	18.2	442.2	3.20	6.0	1.106	
Standard	1.17	1.17	0.30	6.23	0.12	0.00	0.021	

สูตรที่ 29	Stirrer PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	25 phr sample							
	1	143.8	143.8	20.66	449.8	3.56	6	1.160
	2	140.8	140.8	20.23	443.7	3.53	6	1.160
	3	146.2	146.2	21.19	449	3.58	6	1.150
	4	137.3	137.3	20.80	439.5	3.57	6	1.100
	5	141.5	141.5	21.64	441.1	3.82	6	1.090
Mean	141.9	141.9	20.9	444.6	3.61	6.0	1.132	
Standard	3.34	3.34	0.53	4.62	0.12	0.00	0.034	

สูตรที่ 30	Stirrer PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	30 phr sample							
	1	138.5	138.5	19.90	429.9	3.71	6	1.160
	2	121.5	121.5	17.76	413.8	3.65	6	1.140
	3	107	107	16.07	392.8	3.76	6	1.110
	4	129.3	129.3	18.74	421.2	3.68	6	1.150
	5	119.6	119.6	17.49	403.9	3.63	6	1.140
Mean	123.2	123.2	18.0	412.3	3.68	6.0	1.140	
Standard	11.72	11.72	1.43	14.51	0.05	0.00	0.019	

ตาราง ผลการทดสอบชิ้นงาน ดัมเบล (ต่อ)

สูตรที่ 31	Stirrer PAA 10 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	125.6	125.6	18.36	445.6	3.06	6	1.140
2	121.5	121.5	17.76	440.7	3.10	6	1.140	
3	116.2	116.2	16.99	436.4	3.22	6	1.140	
4	119.6	119.6	17.49	443.3	3.16	6	1.140	
5	123.9	123.9	17.80	438.9	3.07	6	1.160	
Mean	121.4	121.4	17.7	441.0	3.12	6.0	1.144	
Standard	3.68	3.68	0.50	3.61	0.07	0.00	0.009	

สูตรที่ 32	Stirrer PAA 15 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	108	108	15.52	397.8	3.61	6	1.160
2	129.3	129.3	18.90	433.3	3.54	6	1.140	
3	108.4	108.4	16.88	401	3.58	6	1.070	
4	110.3	110.3	17.51	415.3	3.74	6	1.050	
5	121.6	121.6	18.59	421.9	3.81	6	1.090	
Mean	115.5	115.5	17.5	413.9	3.66	6.0	1.102	
Standard	9.50	9.50	1.37	14.73	0.11	0.00	0.047	

สูตรที่ 33	Stirrer PAA 20 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	112.7	112.7	16.92	412.6	3.52	6	1.110
2	113.4	113.4	17.03	470.2	4.38	6	1.110	
3	102.8	102.8	15.72	407.6	3.49	6	1.090	
4	105.6	105.6	16.60	446.6	3.92	6	1.060	
5	111.9	111.9	16.95	416.5	3.82	6	1.100	
Mean	109.3	109.3	16.6	430.7	3.83	6.0	1.094	
Standard	4.77	4.77	0.54	26.81	0.36	0.00	0.021	

สูตรที่ 34	Stirrer PAA 25 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	117.2	117.2	17.29	409	4.06	6	1.130
2	108	108	16.07	401.3	3.71	6	1.120	
3	97.63	97.63	14.53	379.5	3.63	6	1.120	
4	106.5	106.5	15.04	383.6	3.62	6	1.180	
5	113.7	113.7	16.62	396.7	3.77	6	1.140	
Mean	108.6	108.6	15.9	394.0	3.76	6.0	1.138	
Standard	7.50	7.50	1.13	12.29	0.18	0.00	0.025	

สูตรที่ 35	Stirrer PAA 30 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	123.8	123.8	18.42	412.4	4.06	6	1.120
2	122.5	122.5	18.39	429.8	4.00	6	1.110	
3	118.6	118.6	17.49	413.4	4.12	6	1.130	
4	128	128	19.05	407.9	4.16	6	1.120	
5	119.7	119.7	18.64	426.2	4.29	6	1.070	
Mean	122.5	122.5	18.4	417.9	4.13	6.0	1.110	
Standard	3.71	3.71	0.57	9.50	0.11	0.00	0.023	

ตาราง ผลการทดสอบชิ้นงาน ดัมเบล (ต่อ)

สูตรที่ 36	Jar mill PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	10 phr sample							
	1	113.2	113.2	17.47	435.9	3.02	6	1.080
	2	122.4	122.4	19.25	453.2	2.93	6	1.060
	3	101.2	101.2	15.62	422.4	2.96	6	1.080
	4	106.3	106.3	15.82	417.6	3.02	6	1.120
	5	115.9	115.9	16.51	443.1	2.70	6	1.170
	Mean	111.8	111.8	16.9	434.4	2.92	6.0	1.102
	Standard	8.27	8.27	1.48	14.64	0.13	0.00	0.044

สูตรที่ 37	Jar mill PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	15 phr sample							
	1	121.1	121.1	18.18	431.1	3.26	6	1.110
	2	102.7	102.7	14.63	404.7	3.31	6	1.170
	3	87.36	87.36	13.12	377.4	3.35	6	1.110
	4	112	108.5	16.00	419.6	3.15	6	1.130
	5	99.68	99.68	15.67	380.9	3.55	6	1.060
	Mean	104.6	103.9	15.5	402.7	3.32	6.0	1.116
	Standard	12.77	12.35	1.87	23.51	0.15	0.00	0.040

สูตรที่ 38	Jar mill PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	20 phr sample							
	1	110.3	110.3	15.85	410.5	3.30	6	1.160
	2	91.32	91.32	12.58	379.5	3.34	6	1.210
	3	84.23	84.23	12.00	387.7	3.27	6	1.170
	4	99.65	99.65	14.83	391.2	3.37	6	1.120
	5	92.95	92.95	13.96	400.6	3.54	6	1.110
	Mean	95.7	95.7	13.8	393.9	3.36	6.0	1.154
	Standard	9.84	9.84	1.58	11.97	0.11	0.00	0.040

สูตรที่ 39	Jar mill PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	25 phr sample							
	1	102.2	102.2	14.44	384.4	3.50	6	1.180
	2	100.3	100.3	14.29	388.6	3.49	6	1.170
	3	98.56	98.56	14.80	417.9	3.37	6	1.110
	4	89.43	89.43	13.67	395.5	3.55	6	1.090
	5	95.68	95.68	13.99	406.2	3.50	6	1.140
	Mean	97.2	97.2	14.2	398.5	3.48	6.0	1.138
	Standard	4.98	4.98	0.43	13.61	0.06	0.00	0.038

สูตรที่ 40	Jar mill PMA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	30 phr sample							
	1	93.84	93.84	14.75	396.4	3.50	6	1.060
	2	91.87	91.87	13.55	324.2	3.47	6	1.130
	3	105.4	105.4	15.83	405.8	3.40	6	1.110
	4	95.26	95.26	14.18	386.2	3.20	6	1.120
	5	99.65	99.65	15.38	335.6	3.39	6	1.080
	Mean	97.2	97.2	14.7	369.6	3.39	6.0	1.100
	Standard	5.40	5.40	0.91	37.15	0.12	0.00	0.029

ตารางผลการทดสอบชิ้นงาน ดัมเบล (ต่อ)

สูตรที่ 41	Jar mill PAA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	10 phr sample							
	1	92.54	92.54	15.27	417.9	3.01	6	1.010
	2	104.4	104.4	16.42	433	3.04	6	1.060
	3	131.2	131.2	19.35	459.2	3.08	6	1.130
	4	129.8	129.8	18.49	428.6	2.90	6	1.170
	5	99.26	99.26	17.05	446.5	3.55	6	0.970
Mean	111.4	111.4	17.3	437.0	3.12	6.0	1.068	
Standard	17.91	17.91	1.63	16.08	0.25	0.00	0.083	

สูตรที่ 42	Jar mill PAA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	15 phr sample							
	1	139.9	139.9	20.63	449	3.34	6	1.130
	2	131	131	18.99	436.9	3.42	6	1.150
	3	105.3	105.3	16.25	400.8	3.23	6	1.080
	4	113.5	113.5	17.20	426.5	3.35	6	1.100
	5	122.3	122.3	18.70	416.8	3.28	6	1.090
Mean	122.4	122.4	18.4	426.0	3.32	6.0	1.110	
Standard	13.71	13.71	1.69	18.49	0.08	0.00	0.029	

สูตรที่ 43	Jar mill PAA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	20 phr sample							
	1	85.68	85.68	12.53	375.9	3.30	6	1.140
	2	87.2	87.2	12.86	389.9	3.22	6	1.130
	3	109.6	109.6	15.48	439	3.42	6	1.180
	4	99.56	99.56	14.82	422.4	3.58	6	1.120
	5	93.26	93.26	13.76	395.6	3.53	6	1.130
Mean	95.1	95.1	13.9	404.6	3.41	6.0	1.140	
Standard	9.81	9.81	1.26	25.60	0.15	0.00	0.023	

สูตรที่ 44	Jar mill PAA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	25 phr sample							
	1	88.35	88.35	12.59	354.7	4.01	6	1.170
	2	106.9	106.9	15.49	385.1	4.00	6	1.150
	3	92.12	92.12	14.48	335.6	3.99	6	1.060
	4	89.69	89.69	13.71	367.3	4.06	6	1.090
	5	94.65	94.65	14.34	379.9	4.13	6	1.100
Mean	94.3	94.3	14.1	364.5	4.04	6.0	1.114	
Standard	7.42	7.42	1.07	20.00	0.06	0.00	0.045	

สูตรที่ 45	Jar mill PAA	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	30 phr sample							
	1	91.78	91.78	13.66	367.6	3.98	6	1.120
	2	87.51	87.51	13.63	357.6	3.98	6	1.070
	3	98.13	98.13	15.00	405.2	3.97	6	1.090
	4	92.36	92.36	14.12	395.6	3.77	6	1.090
	5	96.59	96.59	14.50	384.9	3.62	6	1.110
Mean	93.3	93.3	14.2	382.2	3.86	6.0	1.096	
Standard	4.21	4.21	0.58	19.58	0.16	0.00	0.019	

ตารางผลการทดสอบชิ้นงาน ดั้มเบด (ต่อ)

สูตรที่ 46	d50=1.0 10 phr	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	sample							
	1	118.4	118.4	19.16	449.7	3.24	6	1.030
	2	136.5	136.5	20.68	426.5	3.22	6	1.100
	3	119.33	119.33	18.25	355.5	3.42	6	1.090
	4	139.4	139.4	21.51	394.6	3.39	6	1.080
	5	150.5	150.5	22.60	458.8	3.42	6	1.110
	Mean	132.8	132.8	20.4	417.0	3.34	6.0	1.082
	Standard	13.78	13.78	1.75	42.40	0.10	0.00	0.031

สูตรที่ 47	d50=1.0 15 phr	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	sample							
	1	164.9	164.9	25.69	490.8	3.45	6	1.070
	2	165.3	165.3	25.05	480.7	3.43	6	1.100
	3	137.5	137.5	22.25	460.2	3.44	6	1.030
	4	156.2	156.2	24.56	469.3	3.72	6	1.060
	5	152.6	152.6	23.33	475.9	3.35	6	1.090
	Mean	155.3	155.3	24.2	475.4	3.48	6.0	1.070
	Standard	11.37	11.37	1.38	11.55	0.14	0.00	0.027

สูตรที่ 48	d50=1.0 20 phr	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	sample							
	1	129.4	129.4	19.97	432.6	4.09	6	1.080
	2	119.3	119.3	18.58	397.9	4.11	6	1.070
	3	109.3	109.3	16.56	394.7	3.98	6	1.100
	4	116.6	116.6	18.69	406.2	4.11	6	1.040
	5	111.9	111.9	17.11	413.9	3.97	6	1.090
	Mean	117.3	117.3	18.2	409.1	4.05	6.0	1.076
	Standard	7.81	7.81	1.36	15.14	0.07	0.00	0.023

สูตรที่ 49	d50=1.0 25 phr	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	sample							
	1	138.3	138.3	20.95	434.3	3.99	6	1.100
	2	122	122	19.55	426.9	4.08	6	1.040
	3	126.6	126.6	19.36	421.1	3.98	6	1.090
	4	129.5	129.5	19.98	455.3	4.00	6	1.080
	5	121.2	121.2	18.88	446.6	3.92	6	1.070
	Mean	127.5	127.5	19.7	436.8	3.99	6.0	1.076
	Standard	6.92	6.92	0.78	14.04	0.06	0.00	0.023

สูตรที่ 50	d50=1.0 30 phr	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	sample							
	1	141.8	141.8	21.10	446.6	4.35	6	1.120
	2	123.2	123.2	18.50	409.7	4.13	6	1.110
	3	131.8	131.8	19.79	410.7	4.21	6	1.110
	4	123.6	123.6	18.73	450.1	4.03	6	1.100
	5	121.2	121.2	18.70	424.8	4.31	6	1.080
	Mean	128.3	128.3	19.4	428.4	4.21	6.0	1.104
	Standard	8.56	8.56	1.09	19.22	0.13	0.00	0.015

ตารางผลการทดสอบชิ้นงาน ดั้มเบล (ต่อ)

สูตรที่ 51	d50=1.5 10 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	141.8	141.8	22.51	460.2	3.25	6	1.050
2	134.3	134.3	21.12	496.2	3.24	6	1.060	
3	140.8	140.8	21.14	488.4	2.98	6	1.110	
4	134.9	134.9	20.44	450.3	2.83	6	1.100	
5	129.5	129.5	20.75	475.3	3.14	6	1.040	
Mean	136.3	136.3	21.2	474.1	3.09	6.0	1.072	
Standard	5.07	5.07	0.79	19.07	0.18	0.00	0.031	

สูตรที่ 52	d50=1.5 15 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	154.8	154.8	23.67	439.1	3.39	6	1.090
2	148.8	148.8	22.14	451.6	3.69	6	1.120	
3	143.7	143.7	23.25	460.2	3.39	6	1.030	
4	136.8	136.8	21.71	446.7	3.60	6	1.050	
5	136.7	136.7	21.29	496.2	3.34	6	1.070	
Mean	144.2	144.2	22.4	458.8	3.48	6.0	1.072	
Standard	7.82	7.82	1.01	22.29	0.15	0.00	0.035	

สูตรที่ 53	d50=1.5 20 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	133.5	133.5	21.19	456.3	3.57	6	1.050
2	141.3	141.3	21.61	468.2	3.56	6	1.090	
3	141.9	141.9	22.74	446.9	3.84	6	1.040	
4	135.9	135.9	21.99	438.4	3.75	6	1.030	
5	139.5	139.5	22.14	426.8	3.55	6	1.050	
Mean	138.4	138.4	21.9	447.3	3.65	6.0	1.052	
Standard	3.61	3.61	0.58	15.95	0.13	0.00	0.023	

สูตรที่ 54	d50=1.5 25 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	143.1	143.1	22.50	468.1	3.99	6	1.060
2	148.8	148.8	22.96	466.9	3.80	6	1.080	
3	154.6	154.6	23.42	416.8	3.57	6	1.100	
4	139.7	139.7	21.56	437.8	3.84	6	1.080	
5	131.5	131.5	19.92	426.5	3.82	6	1.100	
Mean	143.5	143.5	22.1	443.2	3.81	6.0	1.084	
Standard	8.80	8.80	1.39	23.38	0.15	0.00	0.017	

สูตรที่ 55	d50=1.5 30 phr sample	Maximum load (N)	Load Break (N)	Stress Break (MPa)	Ext Break (mm)	Modulus at 300% (MPa)	Sample Width (mm)	Sample Thick (mm)
	1	153	153	22.77	447.6	3.88	6	1.120
2	156.5	156.5	23.50	448.8	3.87	6	1.110	
3	149.6	149.6	23.09	458.4	3.79	6	1.080	
4	147.8	147.8	21.99	461.6	3.82	6	1.120	
5	161.6	161.6	24.48	436.2	3.92	6	1.100	
Mean	153.7	153.7	23.2	450.5	3.86	6.0	1.106	
Standard	5.53	5.53	0.92	10.02	0.05	0.00	0.017	