

LAMPIRAN

LAMPIRAN 1. UJI TARIK

a. Model Perhitungan Kuat Tarik

Tabel Spesifikasi perhitungan Material ABS Daur Ulang 1 kali

No	Spesimen	A (mm ²)	σ (Mpa)	ε (%)	E (Mpa)
1.	Spesimen 1	41,011	48,289	15,62	309,15

Diketahui : $t = 4,08 \text{ mm}$ $L_o = 50 \text{ mm}$
 $l = 10,06 \text{ mm}$ $\Delta L_o = 7,810 \text{ mm}$
 $F = 1980,41 \text{ N}$

Ditanya : a. $A = \dots?$ c. $\epsilon = \dots?$
b. $\sigma = \dots?$ d. $E = \dots?$

Jawab :

a. Menghitung luas area (A)

$$\begin{aligned} A &= t \times l \\ &= 4,08 \text{ mm} \times 10,06 \text{ mm} \\ &= 41,01 \text{ mm}^2 \end{aligned}$$

c. Menghitung regangan (ϵ)

$$\begin{aligned} \epsilon &= \frac{\Delta L_o}{L_o} \times 100\% \\ &= \frac{7,810 \text{ mm}}{50 \text{ mm}} \times 100\% \\ &= 15,62 \% \end{aligned}$$

b. Menghitung tegangan (σ)

$$\begin{aligned} \sigma &= \frac{F}{A} \\ &= \frac{1980,41 \text{ N}}{41,01 \text{ mm}^2} \\ &= 48,289 \text{ MPa} \end{aligned}$$

d. Menghitung modulus elastisitas (E)

$$\begin{aligned} E &= \frac{F \times L_o}{A \times \Delta L_o} \\ &= \frac{1980,41 \text{ N} \times 50 \text{ mm}}{41,01 \text{ mm}^2 \times 7,810 \text{ mm}} \\ &= 309,15 \text{ MPa} \end{aligned}$$

b. Model Perhitungan Nilai Presentase Penurunan Kuat Tarik

Tabel Spesifikasi perhitungan Material ABS Daur Ulang 1 kali

Penurunan Kuat Tarik			
No	Variasi	Kuat Tarik (MPa)	Penuruna (%)
1.	ABS Daur Ulang 1 Kali	48,836	9,56 %
2.	ABS Daur Ulang 3 Kali	46,773	13,38 %
3.	ABS Daur Ulang 6 Kali	46,446	13,99 %

Diketahui : ABS Murni Data *Sheet* = 54 MPa

Ditanya : Penurunan =.....?

Jawab :

$$\begin{aligned}
 \text{Penurunan} &= \frac{(\text{ABS murni} - \text{ABS DU 1})}{\text{ABS murni}} \times 100 \% \\
 &= \frac{(54 \text{ MPa} - 48,836 \text{ MPa})}{54 \text{ MPa}} \times 100 \% \\
 &= 9,56 \%
 \end{aligned}$$

11.04.2018

KUAT TARIK

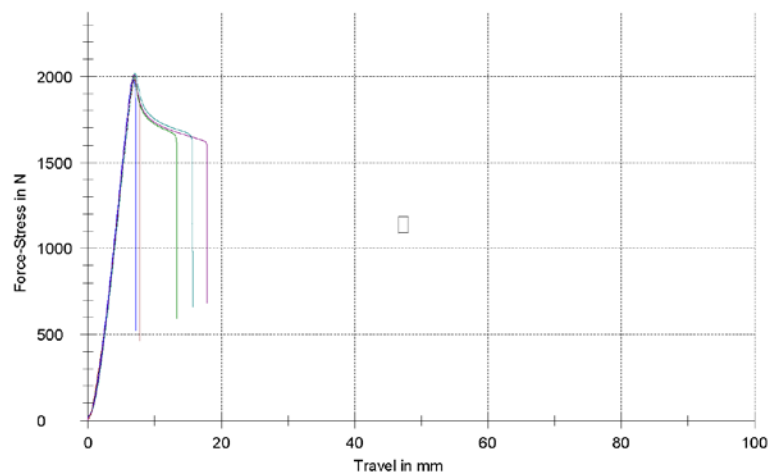
Parameter table:

Headline : KUAT TARIK
 Customer : 590/III/18
 Tester : L TRIYONO
 Material : SPECIMEN MULTIPURPOSE PLASTIK ABS DAUR
 ULANG 1 KALI
 Test standard : ISO 527
 Evaluat. method : M (Automatic A, B or C)
 Specimen holders :
 Extensometer :
 Load cell :

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	201,877	7,81
	2	204,347	13,37
	3	202,181	7,26
	4	205,691	15,69
	5	204,658	17,86

Series graph:



- 11.04.2018

Statistics:

Series n = 5	Fmax Lm kgf	Measurement travel end mm
\bar{x}	203,751	12,40
s	1,652	4,72
v	0,81	38,05






11.04.2018

KUAT TARIK

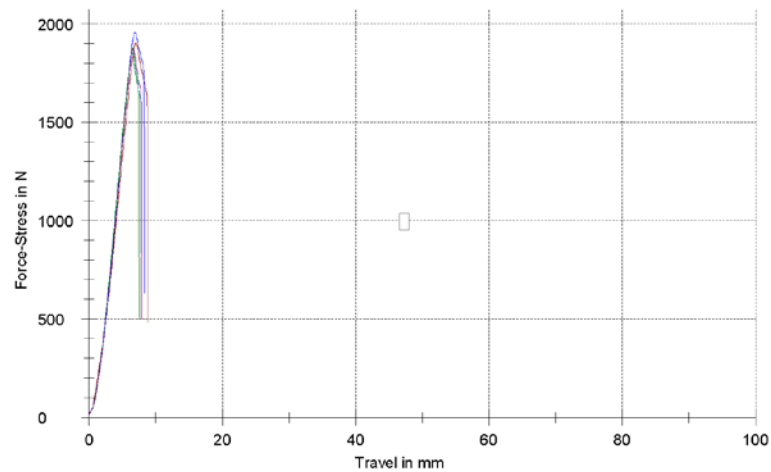
Parameter table:

Headline : KUAT TARIK
 Customer : 591/III/18
 Tester : L TRIYONO
 Material : SPECIMEN MULTIPURPOSE PLASTIK ABS DAUR
 ULANG 3 KALI
 Test standard : ISO 527
 Evaluat. method : M (Automatic A, B or C)
 Specimen holders :
 Extensometer :
 Load cell :

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	194,124	8,84
	2	191,325	7,57
	3	199,396	8,36
	4	188,840	7,88
	5	191,147	7,94

Series graph:



11.04.2018

Statistics:

Series	Fmax Lm	Measurement travel end
n = 5	kgf	mm
x	192,967	8,12
s	4,053	0,49
v	2,10	6,04

11.04.2018

KUAT TARIK

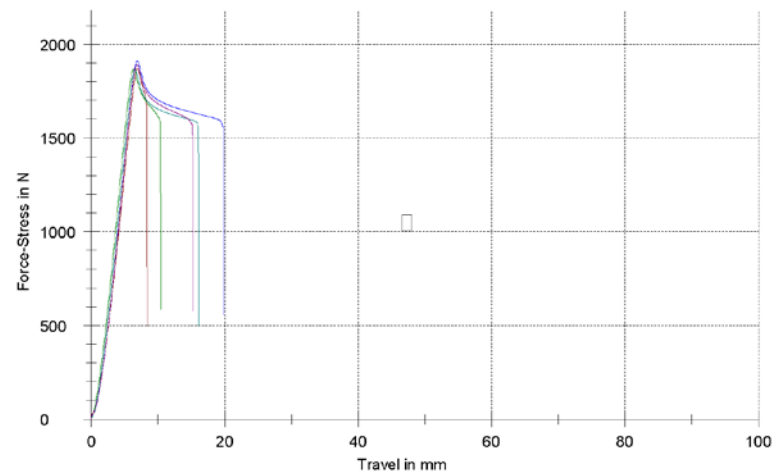
Parameter table:

Headline : KUAT TARIK
 Customer : 592/III/18
 Tester : L TRIYONO
 Material : SPECIMEN MULTIPURPOSE PLASTIK ABS DAUR
 ULANG 6 KALI
 Test standard : ISO 527
 Evaluat. method : M (Automatic A, B or C)
 Specimen holders :
 Extensometer :
 Load cell :

Results:

Legends	Nr	Fmax Lm kgf	Measurement travel end mm
	1	190,724	8,41
	2	190,593	10,47
	3	194,818	19,88
	4	189,961	16,16
	5	192,805	15,20

Series graph:






- 11.04.2018

Statistics:

Series n = 5	Fmax Lm kgf	Measurement travel end mm
\bar{x}	191,780	14,03
s	2,007	4,59
v	1,05	32,74

LAMPIRAN 2. UJI IMPAK

ATMI		POLITEKNIK ATMI SURAKARTA			
		Kampus I : Jl. Mojo No. 1 Surakarta 57145. Phone : +62 271 714466 • Fax : +62 271 714390			
		Kampus II : Jl. Adi Sucipto Km 9,5 Karanganyar 57174. Phone: +62 271 7686220			
		Kotak Pos 215 Surakarta 57102, Jawa Tengah, Indonesia.			
		E-mail: politeknik@atmi.ac.id • Website http://www.atmi.ac.id			
		Zwick / Roell			
Test report					
Customer	: Agus Rifai				
Tester	: Yotam S				
Test standard	: ISO 179-1				
Applied methods	: Charpy impact strength test ISO 179-1/1 e U				
Material	: ABS daur ulang ke 1				
Machine data	: HIT 5,5P				
Nominal work capacity	: 4 J				
Theoretical impact velocity	: 2,901 m/s				
Results:					
No.	b mm	h mm	W J	ak kJ/m ²	Type of failure
1	10,08	4,1	2,04896	49,58	C
2	10,1	4,1	1,84854	44,64	C
3	10,1	4,08	1,10397	26,79	C
4	10,08	4,08	2,67016	64,93	C
5	10,08	4,05	2,76816	67,81	C
Series graph:					
Statistics:					
Total/Hinge break n = 5	b mm	h mm	W J	ak kJ/m ²	
x	10,09	4,082	2,08796	50,75	
s	0,01095	0,02049	0,67615	16,62	
v [%]	0,11	0,50	32,38	32,75	

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	Kotak Pos 215 Surakarta 57102, Jawa Tengah, Indonesia. E-mail: politeknik@atmi.ac.id • Website http://www.atmi.ac.id	
		

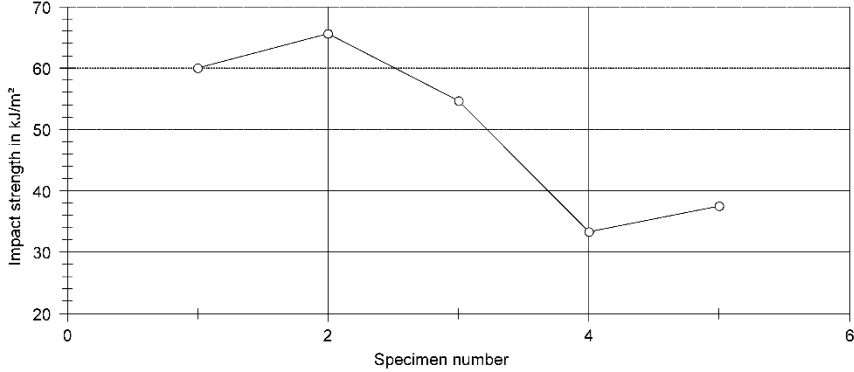
Test report

Customer : Agus Rifai
 Tester : Yotam S
 Test standard : ISO 179-1
 Applied methods : Charpy impact strength test ISO 179-1/1 e U
 Material : ABS daur ulang ke 3
 Machine data : HIT 5,5P
 Nominal work capacity : 4 J
 Theoretical impact velocity : 2,901 m/s

Results:

No.	b mm	h mm	W J	ak kJ/m ²	Type of failure
1	10,1	4	2,42423	60,01	C
2	10,08	4,08	2,69788	65,60	C
3	10,08	4,1	2,25705	54,61	C
4	10,1	4,1	1,37802	33,28	C
5	10,08	4,1	1,54933	37,49	C



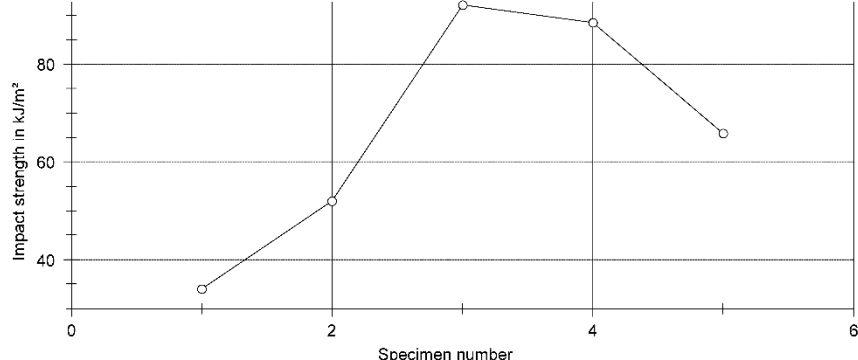
Series graph:



Specimen number	Impact strength in kJ/m ²
1	60,01
2	65,60
3	54,61
4	33,28
5	37,49

Statistics:

Total/Hinge break n = 5	b mm	h mm	W J	ak kJ/m ²
x	10,09	4,076	2,06130	50,20
s	0,01095	0,04336	0,57102	14,15
v [%]	0,11	1,06	27,70	28,19

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	Kampus II : Jl. Adi Sucipto Km 9,5 Karanganyar 57174. Phone: +62 271 7686220				
	Kotak Pos 215 Surakarta 57102, Jawa Tengah, Indonesia. E-mail: politeknik@atmi.ac.id • Website http://www.atmi.ac.id				
					
Test report					
Customer : Agus Rifai					
Tester : Yotam S					
Test standard : ISO 179-1					
Applied methods : Charpy impact strength test ISO 179-1/1 e U					
Material : ABS daur ulang ke 6					
Machine data : HIT 5,5P					
Nominal work capacity : 4 J					
Theoretical impact velocity : 2,901 m/s					
Results:					
	b	h	W	ak	Type of failure
No.	mm	mm	J	kJ/m ²	
1	10,08	4,05	1,40669	33,97	C
2	10,08	4,05	2,15164	51,96	C
3	10,1	4,1	3,81640	92,16	C
4	10,1	4,1	3,66596	88,53	C
5	10,08	4,1	2,72538	65,81	C
Series graph:					
					
Statistics:					
Total/Hinge break n = 5	Work capacity J	b mm	h mm	W J	ak kJ/m ²
x	4,00	10,09	4,08	2,75321	66,49
s	0,00	0,01095	0,02739	1,01726	24,57
v [%]	0,00	0,11	0,67	36,95	36,95

ABS daur ulang 6 kali.zs2

LAMPIRAN 3. UJI KEKERASAN



BADAN PENELITIAN DAN PENGEMBANGAN INDUSTRI
BALAI BESAR KULIT, KARET DAN PLASTIK
LABORATORIUM PENGUJIAN DAN KALIBRASI
Jalan Sokonandi No. 9 Telp. (0274) 512929 Fax. (0274) 563655
YOGYAKARTA - 55166

Nomor Seri : 2018.a.590/F
Number Series

Halaman 1 dari 1
Page 1 of 1

SURAT TANDA UJI

(Testing Certificate)

Nomor Pengujian : 590/LUPKPP – PLASTIK/IV/18
Test Report Number

Bahan / Barang : Specimen Multipurpose Plastik ABS Daur Ulang
Material / Commodity

Kondisi Sampel : Baik
Condition of Sample

Merek / Kode : 1 H, 1 T
Mark / Code

Contoh Diterima Tanggal : 2 April 2018
Sample Received on

Contoh Mulai Diuji Tanggal : 3 April 2018
Sample Start Tested on

Dibuat Untuk : Agus Rifai
Name and address of client
Fakultas Teknik, Jurusan Teknik Mesin, Universitas Muhammadiyah Yogyakarta

Metode Uji : ISO
Test Methods

Hasil Pengujian : Sebagai berikut,
Test Result

No.	Parameter Uji	Kode	Hasil Uji					Metode Uji
			1	2	3	4	5	
1.	Kekuatan tarik, N/mm ²	1 T	49,15	50,16	49,47	50,44	50,24	ISO 527
2.	Kekerasan, Shore D	1 H	77,0	71,50	70,57	75,0	73,13	ISO 7619

Yogyakarta, 18 April 2018
Kepala Balai Besar Kulit, Karet dan Plastik *h*
Agus Kuntoro
Agus Kuntoro
NIP. 196304041992031010

Nomor Seri : 2018.a.591/F
 Number Series

 Halaman : 1 dari 1
 Page : 1 of 1

SURAT TANDA UJI

(Testing Certificate)

Nomor Pengujian : 591/LUPKKP – PLASTIK/IV/18
Test Report Number

Bahan / Barang : Specimen Multipurpose Plastik ABS Daur Ulang
Material / Commodity

Kondisi Sampel : Baik
Condition of Sample

Merek / Kode : 3 H, 3 T
Mark / Code

Contoh Diterima Tanggal : 2 April 2018
Sample Received on

Contoh Mulai Diuji Tanggal : 3 April 2018
Sample Start Tested on

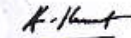
Dibuat Untuk : Agus Rifai
Name and address of client : Fakultas Teknik, Jurusan Teknik Mesin, Universitas Muhammadiyah Yogyakarta

Metode Uji : ISO
Test Methods

Hasil Pengujian : Sebagai berikut,
Test Result

No.	Parameter Uji	Kode	Hasil Uji					Metode Uji
			1	2	3	4	5	
1.	Kekuatan tarik, N/mm ²	3 T	47,73	47,29	49,19	46,68	47,31	ISO 527
2.	Kekerasan, Shore D	3 H	70,77	77,40	70,13	73,73	71,20	ISO 7619

 Yogyakarta, 18 April 2018
 Kepala Balai Besar Kulit, Karet dan Plastik


Agus Kuntoro

NIP. 196304041992031010

Nomor Seri : 2018.a.592/F
Number Series

Halaman 1 dari 1
Page 1 of 1

SURAT TANDA UJI

(Testing Certificate)

Nomor Pengujian : 592/LUPKKP – PLASTIK/IV/18
Test Report Number

Bahan / Barang : Specimen Multipurpose Plastik ABS Daur Ulang
Material / Commodity

Kondisi Sampel : Baik
Condition of Sample

Merek / Kode : 6 H, 6 T
Mark / Code

Contoh Diterima Tanggal : 2 April 2018
Sample Received on

Contoh Mulai Diuji Tanggal : 3 April 2018
Sample Start Tested on

Dibuat Untuk : Agus Rifai
Name and address of client
Fakultas Teknik, Jurusan Teknik Mesin, Universitas
Muhammadiyah Yogyakarta

Metode Uji : ISO
Test Methods

Hasil Pengujian : Sebagai berikut,
Test Result

No.	Parameter Uji	Kode	Hasil Uji					Metode Uji
			1	2	3	4	5	
1.	Kekuatan tarik, N/mm ²	6 T	47,05	47,13	48,16	46,86	47,67	ISO 527
2.	Kekerasan, Shore D	6 H	75,13	73,63	69,17	76,30	75,23	ISO 7619

Yogyakarta, 18 April 2018
Kepala Balai Besar Kulit, Karet dan Plastik


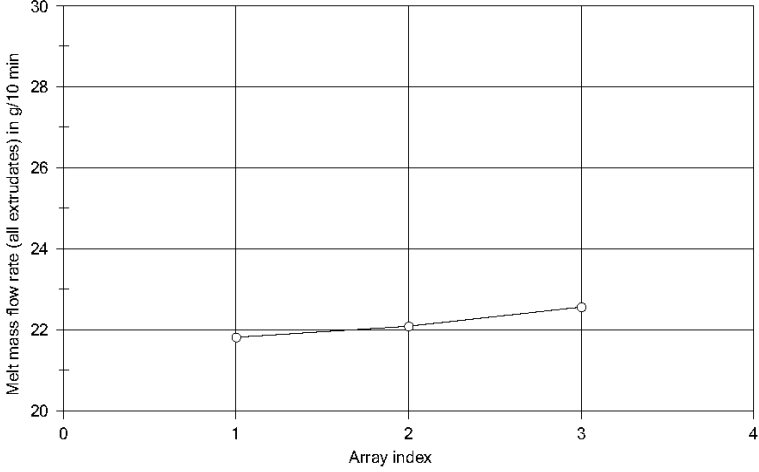


Agus Kuntoro

NIP 196304041952031010

Typical Hardness Shore D Values			
Name of the polymer	Explicit name of the polymer	Min Value	Max Value
ABS	Acrylonitrile-Butadiene Styrene	100.000	100.000
ABS FR	Acrylonitrile-Butadiene Styrene flame retardant	80.000	90.000
ABS High Heat	Acrylonitrile-Butadiene Styrene High Heat	80.000	85.000
ABS High Impact	Acrylonitrile-Butadiene Styrene High Impact	75.000	85.000
ABS/PC	Acrylonitrile-Butadiene Styrene/Polycarbonate	85.000	90.000
ABS/PC 20% GF	Acrylonitrile-Butadiene Styrene/Polycarbonate 20% glass fiber	85.000	93.000
ABS/PC FR	Acrylonitrile-Butadiene Styrene/Polycarbonate flame retardant	85.000	93.000
ASA	Acrylonitrile Styrene Acrylate	75.000	80.000
ASA/PC	Acrylonitrile Styrene Acrylate/Polycarbonate	80.000	85.000
ASA/PC FR	Acrylonitrile Styrene Acrylate/Polycarbonate flame retardant	80.000	90.000
ASA/PVC	Acrylonitrile Styrene Acrylate/Polyvinyl Chloride	75.000	90.000
CA - Cellulose Acetate	Cellulose Acetate	50.000	95.000
CAB - Cellulose Acetate Butyrate	Cellulose Acetate Butyrate	60.000	90.000
CP - Cellulose Propionate	Cellulose Propionate	40.000	95.000
CPVC - Chlorinated Polyvinyl Chloride	CPVC - Chlorinated Polyvinyl Chloride	83.000	90.000
ECTFE	Ethylene Chlorotrifluoroethylene	75.000	75.000
ETFE	Ethylene Tetrafluoroethylene	70.000	75.000
EVA	Ethylene Vinyl Acetate	15.000	45.000
FEP	Fluorinated Ethylene Propylene	60.000	65.000
HDPE - High Density Polyethylene	HDPE - High Density Polyethylene	60.000	70.000
HIPS - High Impact Polystyrene	HIPS - High Impact Polystyrene	60.000	75.000
HIPS FR V0	High Impact Polystyrene flame retardant V0	60.000	70.000

LAMPIRAN 4. UJI MFI

ATMI		POLITEKNIK ATMI SURAKARTA					
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		Kotak Pos 215 Surakarta 57102, Jawa Tengah, Indonesia.					
		E-mail: politeknik@atmi.ac.id • Website http://www.atmi.ac.id					
		Zwick / Roell					
Test report							
Customer : Agus Rifai							
Tester : Yotam S							
Material : ABS daur ulang ke 1							
Test definition of extrusion test (Automatic) : ISO 1133 Accurate							
Test conditions : U (220 °C; 10 kg)							
Set temperature : 220,0 °C							
Test load : 10.0 kg							
Test results:							
No.	Index	Weight gram	Times second	MFR _n g/10 min	$\overline{\text{MFR}}$ g/10 min	MVR _n cm ³ /10 min	$\overline{\text{MVR}}$ cm ³ /10 min
1	1	0,6783	18,66	21,81	22,16	22,88	23,24
	2	0,6788	18,42	22,11		23,18	
	3	0,6789	18,04	22,57		23,67	
Series graph:							
							
Statistics:							
Series	MFR	MVR					
n = 1	g/10 min	cm ³ /10 min					
\bar{x}	22,16	23,24					
s	-	-					
v [%]	-	-					


POLITEKNIK ATMI SURAKARTA

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Kotak Pos 215 Surakarta 57102, Jawa Tengah, Indonesia.

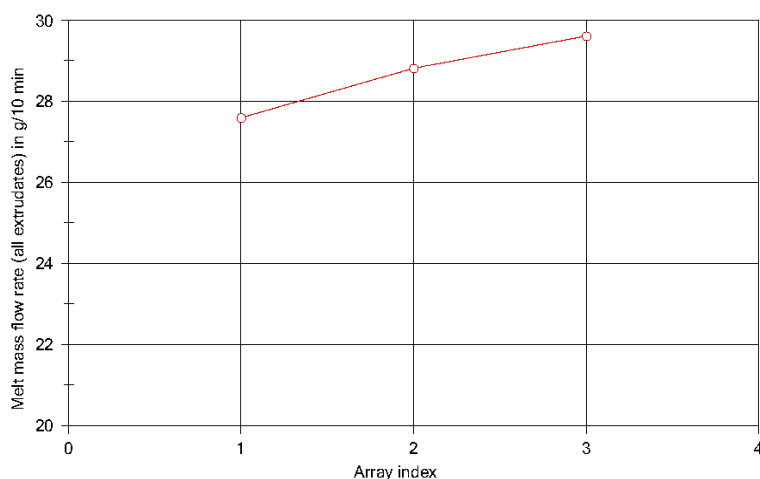
 E-mail: politeknik@atmi.ac.id • Website <http://www.atmi.ac.id>
Zwick / Roell
Test report

 Customer : Agus Rifai
 Tester : Yotam S
 Material : ABS daur ulang ke 3

 Test definition of extrusion test (Automatic) : ISO 1133 Accurate
 Test conditions : U (220 °C; 10 kg)
 Set temperature : 220,0 °C
 Test load : 10.0 kg

Test results:

No.	Index	Weight gram	Times second	MFR _n g/10 min	$\overline{\text{MFR}}$ g/10 min	MVR _n cm ³ /10 min	$\overline{\text{MVR}}$ cm ³ /10 min
1	1	0,6776	14,73	27,60	28,69	28,99	30,12
	2	0,6789	14,11	28,87		30,27	
	3	0,6777	13,73	29,62		31,10	

Series graph:

Statistics:

Series	$\overline{\text{MFR}}$ g/10 min	$\overline{\text{MVR}}$ cm ³ /10 min
n = 1	28,69	30,12
\bar{x}	-	-
s	-	-
v [%]	-	-


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Kotak Pos 215 Surakarta 57102, Jawa Tengah, Indonesia.

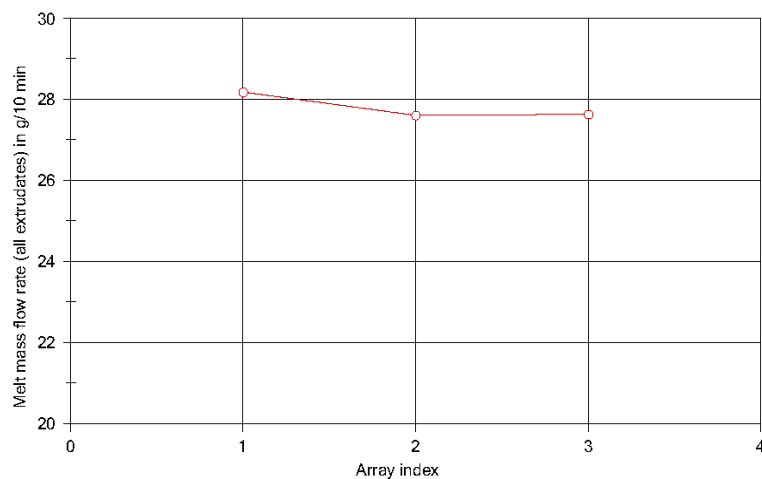
 E-mail: politeknik@atmi.ac.id • Website <http://www.atmi.ac.id>
Zwick / Roell
Test report

 Customer : Agus Rifai
 Tester : Yotam S
 Material : ABS daur ulang ke 6

 Test definition of extrusion test (Automatic) : ISO 1133 Accurate
 Test conditions : U (220 °C; 10 kg)
 Set temperature : 220,0 °C
 Test load : 10.0 kg

Test results:

No.	Index	Weight gram	Times second	MFR _n g/10 min	$\overline{\text{MFR}}$ g/10 min	MVR _n cm ³ /10 min	$\overline{\text{MVR}}$ cm ³ /10 min
1	1	0,6758	14,44	28,08	27,72	29,57	29,17
	2	0,6763	14,74	27,53		28,96	
	3	0,6769	14,73	27,57		28,99	

Series graph:

Statistics:

Series	$\overline{\text{MFR}}$ g/10 min	$\overline{\text{MVR}}$ cm ³ /10 min
n = 1	27,72	29,17
\bar{x}	-	-
s	-	-
v [%]	-	-