

LAMPIRAN

PERHITUNGAN KEKERASAN

1. Raw Material

Posisi Titik 1. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 30,5 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,0305 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0305^2)} = 49,8 \text{ VHN}$$

Posisi Titik 2. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 30,5 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,0305 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0305^2)} = 49,8 \text{ VHN}$$

Posisi Titik 3. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 30 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,0300 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0300^2)} = 51,5 \text{ VHN}$$

$$\text{Kekerasan rata-rata} = 49,8 + 49,8 + 51,5 = \underline{\underline{50,36 \text{ VHN}}}$$

2. 0,016A/mm²

Posisi Titik 1. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 32 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,032 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0350^2)} = 45,3 \text{ VHN}$$

Posisi Titik 2. Diketahui : P = 25 gf

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 32,5 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,0325 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0325^2)} = 43,9 \text{ VHN}$$

Posisi Titik 3. Diketahui : P = 25 gf

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 32 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,0320 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0320^2)} = 45,3 \text{ VHN}$$

Kekerasan rata-rata = 45,3 + 43,9 + 45,3 = 44,83 VHN

3. 0,022A/mm²

Posisi Titik 1. Diketahui : P = 25 gf

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 32 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,0320 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0320^2)} = 45,3 \text{ VHN}$$

Posisi Titik 2. Diketahui : P = 25 gf

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 31 \mu\text{m} \times 10^{-3} \text{ mm} = 0,0310 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0310^2)} = 48,2 \text{ VHN}$$

Posisi Titik 3. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 31,75 \mu\text{m} \times 10^{-3} \text{ mm} = 0,03175 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,03175^2)} = 56 \text{ VHN}$$

Kekerasan rata-rata = 45,3 + 48,2 + 46 = 46,5 VHN

4. $0,028 \text{ A/mm}^2$

Posisi Titik 1. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 31 \mu\text{m} \times 10^{-3} \text{ mm} = 0,0310 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0310^2)} = 48,2 \text{ VHN}$$

Posisi Titik 2. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 31 \mu\text{m} \times 10^{-3} \text{ mm} = 0,0310 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,0310^2)} = 48,2 \text{ VHN}$$

Posisi Titik 3. Diketahui : $P = 25 \text{ gf}$

$$P = 25 \text{ gf} \times 10^{-3} \text{ kgf} = 0,025 \text{ kgf}$$

$$d_{\text{rata-rata}} = 31,25 \text{ } \mu\text{m} \times 10^{-3} \text{ mm} = 0,03125 \text{ mm}$$

Ditanyakan : Kekerasan = ?

$$\text{Penyelesaian : Kekerasan} = \frac{1.854 \times P}{(d)^2}$$

$$\text{Kekerasan} = \frac{1.854 \times 0.025}{(0,03125)^2} = 47,5 \text{ VHN}$$

$$\text{Kekerasan rata-rata} = 48,2 + 48,2 + 47,5 = \underline{\underline{47,96 \text{ VHN}}}$$

Perhitungan Laju Korosi

1. Raw Material

Diketahui : K (Constant factor) = 0,00327 mm/yr

$$a \text{ (massa atom Al)} = 26,981$$

$$i \text{ (inersia korosi)} = 96,000 \text{ } \mu\text{A/cm}^2$$

$$n \text{ (elektron valensi Al)} = 3$$

$$\rho \text{ (berat jenis Al)} = 2,7 \text{ g/cm}^3$$

Ditanyakan : CR (Corrosion rate) = ?

$$\text{Penyelesaian : CR} = K \frac{a \times i}{n \times \rho}$$

$$\text{CR} = 0,00327 \times \frac{26,981 \times 96,000 \text{ } \mu\text{A/cm}^2}{3 \times 2,7 \text{ g/cm}^3} = 1,045 \text{ mm/yr}$$

2. 0,016A/mm²

Diketahui : K (Constant factor) = 0,00327 mm/yr

$$a \text{ (massa atom Al)} = 26,981$$

$$i \text{ (inersia korosi)} = 91,100 \text{ } \mu\text{A/cm}^2$$

$$n \text{ (elektron valensi Al)} = 3$$

$$\rho \text{ (berat jenis Al)} = 2,7 \text{ g/cm}^3$$

Ditanyakan : CR (Corrosion rate) = ?

$$\text{Penyelesaian : CR} = K \frac{a \times i}{n \times \rho}$$

$$\text{CR} = 0,00327 \times \frac{26,981 \times 91,100 \text{ } \mu\text{A/cm}^2}{3 \times 2,7 \text{ g/cm}^3} = 0,992 \text{ mm/yr}$$

3. $0,022\text{A/mm}^2$

Diketahui : K (*Constant factor*) = $0,00327\text{ mm/yr}$

$$a \text{ (massa atom Al)} = 26,981$$

$$i \text{ (inersia korosi)} = 97,810\ \mu\text{A/cm}^2$$

$$n \text{ (elektron valensi Al)} = 3$$

$$\rho \text{ (berat jenis Al)} = 2,7\ \text{g/cm}^3$$

Ditanyakan : CR (*Corrosion rate*) = ?

Penyelesaian : $CR = K \frac{a \times i}{n \times \rho}$

$$CR = 0,00327 \times \frac{26,981 \times 97,810\ \mu\text{A/cm}^2}{3 \times 2,7\ \text{g/cm}^3} = 10,65\ \text{mm/yr}$$

4. $0,028\text{A/mm}^2$

Diketahui : K (*Constant factor*) = $0,00327\text{ mm/yr}$

$$a \text{ (massa atom Al)} = 26,981$$

$$i \text{ (inersia korosi)} = 89,620\ \mu\text{A/cm}^2$$

$$n \text{ (elektron valensi Al)} = 3$$

$$\rho \text{ (berat jenis Al)} = 2,7\ \text{g/cm}^3$$

Ditanyakan : CR (*Corrosion rate*) = ?

Penyelesaian : $CR = K \frac{a \times i}{n \times \rho}$

$$CR = 0,00327 \times \frac{26,981 \times 89,620\ \mu\text{A/cm}^2}{3 \times 2,7\ \text{g/cm}^3} = 0,972\ \text{mm/yr}$$



LABORATORIUM PUSAT SAINS DAN TEKNOLOGI AKSELERATOR - BATAN

Jl. Babarsari Kotak Pos 6101 Ykbb, Yogyakarta 55281, Telp. (62) (0274) 488435, 484436, Fax. (0274) 489762

Form-29/Sert/Uji,

Nomor : 050/STA/VI/2017
Number
Halaman : 1 dari 1
Page

Sertifikat Pengujian Test Certificate

Dibuat untuk : Alif Hermawan
Certified for
Jenis / Nama Contoh : Aluminium
Type / Name of sample
Asal Contoh : Alif Hermawan
Origin of sample
Jumlah Contoh : 4 (Empat)
Amount of sample
Kode Contoh : 076/P/STA/17
Sample Code
Parameter : Uji Korosi
Parameters
Tanggal Pengambilan Contoh : —
Sample taken on
Tanggal Penerimaan Contoh : 29 Mei 2017
Sample received on
Tanggal Pengujian Contoh : 29 Mei – 09 Juni 2017
Sample tested on

Hasil Pengujian Test Result

Nama Contoh	Kode Contoh	Label Contoh	Parameter	Hasil Uji	Satuan	Metode Uji
Aluminium	076/P/STA/17	1. RM (Raw Material)	Korosi	96,000	$\mu\text{A}/\text{cm}^2$	Elektrokimia
		Sebelum Uji Korosi	Berat	1,081	gr	Neraca Analitik
		Sesudah Uji Korosi	Berat	1,080	gr	Neraca Analitik
		2. Arus 3 A	Korosi	91,100	$\mu\text{A}/\text{cm}^2$	Elektrokimia
		Sebelum Uji Korosi	Berat	0,966	gr	Neraca Analitik
		Sesudah Uji Korosi	Berat	0,965	gr	Neraca Analitik
		3. Arus 4 A	Korosi	97,810	$\mu\text{A}/\text{cm}^2$	Elektrokimia
		Sebelum Uji Korosi	Berat	1,008	gr	Neraca Analitik
		Sesudah Uji Korosi	Berat	1,008	gr	Neraca Analitik
		4. Arus 5 A	Korosi	89,260	$\mu\text{A}/\text{cm}^2$	Elektrokimia
		Sebelum Uji Korosi	Berat	0,976	gr	Neraca Analitik
		Sesudah Uji Korosi	Berat	0,975	gr	Neraca Analitik

Yogyakarta, 12 Juni 2017
Manajer Teknik,

H. Samin Prihatin
NIP. 195512051978031002

- Catatan : 1. Hasil pengujian ini hanya berlaku untuk contoh yang diuji
Note These test result are only valid for the tested sample
2. Sertifikat ini tidak boleh diperbanyak/digandakan tanpa izin dari Manajer Teknik Laboratorium
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LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

HASIL PENGUJIAN KEKERASAN

No. 066 / P.Kkr / BT.DTM / 2017

Spesimen Anodizing (Aluminium)

No	Variasi	Posisi titik uji	d ₁ (μm)	d ₂ (μm)	d _{rata-rata} (μm)	Kekerasan (VHN)
1	RM	Acak	31.0	30.0	30.50	49.8
			30.0	31.0	30.50	49.8
			30.0	30.0	30.00	51.5
2	3 Ampere	Acak	33.0	31.0	32.00	45.3
			33.0	32.0	32.50	43.9
			33.0	31.0	32.00	45.3
3	4 Ampere	Acak	32.0	32.0	32.00	45.3
			31.0	31.0	31.00	48.2
			30.5	33.0	31.75	46.0
4	5 Ampere	Acak	31.0	31.0	31.00	48.2
			31.0	31.0	31.00	48.2
			30.5	32.0	31.25	47.5

Keterangan :

1. Menggunakan metode uji Vikers dengan pembebanan 25 gf
2. Satuan pengukuran diagonal jejak indenter dalam μm
3. Pengujian dilakukan pada tanggal 24 Mei 2017

Yogyakarta, 24 Mei 2017
Staf Laboratorium Bahan Teknik



Wiyadi

Lembar asli, tidak untuk digandakan