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LAMPIRAN

A. PERHITUNGAN UJI *IMPACT*

Perhitungan uji *impact charpy*

$$HI = \frac{E}{A}$$

$$E = G \times R (\cos \beta - \cos \alpha)$$

Keterangan :

E = Energi yang diserap untuk mematahkan *specimen* (J)

G = Berat *hammer* (N)

R = Panjang pendulum (m)

HI = Harga *impact* per satuan luas (J/mm²)

A = Luas penampang *specimen* (mm²)

α = Besarnya sudut awal jatuh pendulum (°)

β = Besar sudut pantul pendulum setelah menabrak *specimen* (°)

a) Raw Material

1) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (147,50^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$E = KV = G.R (\cos \beta - \cos \alpha)$$

$$= 196,13 \times 0,8 (\cos (147,50) - \cos (151))$$

$$= 156,904 \times 0,031$$

$$= 5,0 \text{ J}$$

$$\text{Nilai } impact \text{ I} = \frac{E}{A}$$

$$= \frac{5,0}{107,6}$$

$$= 0,046 \text{ J/mm}^2$$

Jadi nilai *impact* adalah $0,046 \text{ J/mm}^2$

2) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (148,00^\circ)$$

Ditanya : Nilai *impact* J/mm^2

$$E = KV = G.R (\cos \beta - \cos \alpha)$$

$$= 196,13 \times 0,8 (\cos (148,00) - \cos (151))$$

$$= 156,904 \times 0,026$$

$$= 4,3 \text{ J}$$

$$\text{Nilai } impact \text{ I} = \frac{E}{A}$$

$$= \frac{4,3}{100,9}$$

$$= 0,042 \text{ J/mm}^2$$

Jadi nilai *impact* adalah $0,042 \text{ J/mm}^2$

3) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (147,50^\circ)$$

Ditanya : Nilai *impact* J/mm^2

$$E = KV = G \cdot R (\cos \beta - \cos \alpha)$$

$$= 196,13 \times 0,8 (\cos (147,50) - \cos (151))$$

$$= 156,904 \times 0,031$$

$$= 5,0 \text{ J}$$

$$\text{Nilai } \textit{impact} \text{ I} = \frac{E}{A}$$

$$= \frac{5,0}{103,5}$$

$$= 0,048 \text{ J}/\text{mm}^2$$

Jadi nilai *impact* adalah $0,048 \text{ J}/\text{mm}^2$

b) Al + 1,5% Mg

1) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (147,75^\circ)$$

Ditanya : Nilai *impact* J/mm^2

$$\begin{aligned}
 E &= KV = G.R (\cos \beta - \cos \alpha) \\
 &= 196,13 \times 0,8 (\cos (147,75) - \cos (151)) \\
 &= 156,904 \times 0,028 \\
 &= 4,6 \text{ J}
 \end{aligned}$$

$$\begin{aligned}
 \text{Nilai } impact \text{ I} &= \frac{E}{A} \\
 &= \frac{4,6}{105,5} \\
 &= 0,044 \text{ J/mm}^2
 \end{aligned}$$

Jadi nilai *impact* adalah 0,044 J/mm²

2) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (148,00^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$\begin{aligned}
 E &= KV = G.R (\cos \beta - \cos \alpha) \\
 &= 196,13 \times 0,8 (\cos (148,00) - \cos (151)) \\
 &= 156,904 \times 0,026 \\
 &= 4,3 \text{ J}
 \end{aligned}$$

$$\begin{aligned}
 \text{Nilai } impact \text{ I} &= \frac{E}{A} \\
 &= \frac{4,3}{111,4}
 \end{aligned}$$

$$= 0,038 \text{ J/mm}^2$$

Jadi nilai *impact* adalah 0,038 J/mm²

3) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (148,50^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$E = KV = G \cdot R (\cos \beta - \cos \alpha)$$

$$= 196,13 \times 0,8 (\cos (148,50) - \cos (151))$$

$$= 156,904 \times 0,022$$

$$= 3,5 \text{ J}$$

$$\text{Nilai } impact \text{ I} = \frac{E}{A}$$

$$= \frac{3,5}{105,0}$$

$$= 0,034 \text{ J/mm}^2$$

Jadi nilai *impact* adalah 0,034 J/mm²

c) Al + 3,5% Mg

1) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (148,00^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$\begin{aligned} E = KV &= G.R (\cos \beta - \cos \alpha) \\ &= 196,13 \times 0,8 (\cos (148,00) - \cos (151)) \\ &= 156,904 \times 0,026 \\ &= 4,3 \text{ J} \end{aligned}$$

$$\begin{aligned} \text{Nilai } \textit{impact} \text{ I} &= \frac{E}{A} \\ &= \frac{4,3}{110,8} \\ &= 0,038 \text{ J/mm}^2 \end{aligned}$$

Jadi nilai *impact* adalah 0,038 J/mm²

2) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (147,75^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$\begin{aligned} E = KV &= G.R (\cos \beta - \cos \alpha) \\ &= 196,13 \times 0,8 (\cos (147,75) - \cos (151)) \\ &= 156,904 \times 0,028 \\ &= 4,6 \text{ J} \end{aligned}$$

$$\text{Nilai } \textit{impact} \text{ I} = \frac{E}{A}$$

$$= \frac{4,6}{105,3}$$

$$= 0,044 \text{ J/mm}^2$$

Jadi nilai *impact* adalah 0,044 J/mm²

3) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (148,25^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$E = KV = G.R (\cos \beta - \cos \alpha)$$

$$= 196,13 \times 0,8 (\cos (148,25) - \cos (151))$$

$$= 156,904 \times 0,024$$

$$= 3,9 \text{ J}$$

$$\text{Nilai } \textit{impact} \text{ I} = \frac{E}{A}$$

$$= \frac{3,9}{104,0}$$

$$= 0,037 \text{ J/mm}^2$$

Jadi nilai *impact* adalah 0,037 J/mm²

d) Al + 5,5% Mg

1) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (147,75^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$E = KV = G.R (\cos \beta - \cos \alpha)$$

$$= 196,13 \times 0,8 (\cos (147,75) - \cos (151))$$

$$= 156,904 \times 0,028$$

$$= 4,6 \text{ J}$$

$$\text{Nilai } \textit{impact} \text{ I} = \frac{E}{A}$$

$$= \frac{4,6}{102,3}$$

$$= 0,045 \text{ J/mm}^2$$

Jadi nilai *impact* adalah 0,045 J/mm²

2) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (148,00^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$E = KV = G.R (\cos \beta - \cos \alpha)$$

$$= 196,13 \times 0,8 (\cos (148,00) - \cos (151))$$

$$= 156,904 \times 0,026$$

$$= 4,3 \text{ J}$$

$$\begin{aligned}\text{Nilai } impact \text{ I} &= \frac{E}{A} \\ &= \frac{4,3}{107,1} \\ &= 0,040 \text{ J/mm}^2\end{aligned}$$

Jadi nilai *impact* adalah 0,040 J/mm²

3) Energi *impact*

$$G = 20\text{kg} = (196,13 \text{ N})$$

$$R = (0,8 \text{ m})$$

$$\alpha = (151^\circ)$$

$$\beta = (148,00^\circ)$$

Ditanya : Nilai *impact* J/mm²

$$\begin{aligned}E = KV &= G.R (\cos \beta - \cos \alpha) \\ &= 196,13 \times 0,8 (\cos (148,00) - \cos (151)) \\ &= 156,904 \times 0,026 \\ &= 4,3 \text{ J}\end{aligned}$$

$$\begin{aligned}\text{Nilai } impact \text{ I} &= \frac{E}{A} \\ &= \frac{4,3}{103,5} \\ &= 0,041 \text{ J/mm}^2\end{aligned}$$

Jadi nilai *impact* adalah 0,041 J/mm²

B. PERHITUNGAN UJI TARIK

Perhitungan uji tarik

Rumus tegangan tarik :

$$\sigma = \frac{F}{A_0}$$

Rumus regangan tarik :

$$\varepsilon = \frac{l_i - l_0}{l_0} \times 100$$

$$= \frac{\Delta l}{l_0} \times 100$$

Keterangan :

σ = Tegangan tarik (N/mm²)

F = Beban (N)

A_0 = Luas penampang (mm²)

ε = Regangan

l_i = Panjang akhir (mm)

l_0 = Panjang awal (mm)

Δl = Pertambahan panjang (mm)

a) Raw Material

1) Diketahui :

$$F = 9,96 \text{ KN} = (9960 \text{ N})$$

$$A_0 = 10,24 \times 12,42 = (127,1808 \text{ mm}^2)$$

$$l_i = (50,66 \text{ mm})$$

$$l_o = (50 \text{ mm})$$

$$\Delta l = (0,66 \text{ mm})$$

Ditanya : $\sigma =$ Tegangan Tarik (N/mm^2)

$\varepsilon =$ Regangan

$$\sigma = \frac{F}{A_0}$$

$$= \frac{9960}{127,1808}$$

$$= 78,31 \text{ N/mm}^2$$

$$\varepsilon = \frac{l_i - l_o}{l_o} \times 100$$

$$= \frac{\Delta l}{l_o} \times 100$$

$$\varepsilon = \frac{50,66 - 50}{50} \times 100$$

$$= \frac{0,66}{50} \times 100$$

$$= 1,32 \%$$

2) Diketahui :

$$F = 9,39 \text{ KN} = (9390 \text{ N})$$

$$A_o = 10,36 \times 11,68 = (121,0048 \text{ mm}^2)$$

$$l_i = (50,40 \text{ mm})$$

$$l_o = (50 \text{ mm})$$

$$\Delta l = (0,40 \text{ mm})$$

Ditanya : σ = Tegangan Tarik (N/mm²)

ε = Regangan

$$\sigma = \frac{F}{A_0}$$

$$= \frac{9390}{121,0048}$$

$$= 77,60 \text{ N/mm}^2$$

$$\varepsilon = \frac{l_i - l_0}{l_0} \times 100$$

$$= \frac{\Delta l}{l_0} \times 100$$

$$\varepsilon = \frac{50,40 - 50}{50} \times 100$$

$$= \frac{0,40}{50} \times 100$$

$$= 0,80 \%$$

3) Diketahui :

$$F = 6,51 \text{ KN} = (6510 \text{ N})$$

$$A_0 = 10,16 \times 12,78 = (129,8448 \text{ mm}^2)$$

$$l_i = (50,62 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,62 \text{ mm})$$

Ditanya : σ = Tegangan Tarik (N/mm²)

ε = Regangan

$$\begin{aligned}\sigma &= \frac{F}{A_0} \\ &= \frac{6510}{129,8448} \\ &= 50,14 \text{ N/mm}^2\end{aligned}$$

$$\begin{aligned}\varepsilon &= \frac{l_i - l_0}{l_0} \times 100 \\ &= \frac{\Delta l}{l_0} \times 100 \\ \varepsilon &= \frac{50,62 - 50}{50} \times 100 \\ &= \frac{0,62}{50} \times 100 \\ &= 1,24 \%\end{aligned}$$

b) Al + 1,5% Mg

1) Diketahui :

$$F = 9,71 \text{ KN} = (9710 \text{ N})$$

$$A_0 = 10,26 \times 12,78 = (131,1228 \text{ mm}^2)$$

$$l_i = (50,72 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,72 \text{ mm})$$

Ditanya : σ = Tegangan Tarik (N/mm^2)

ε = Regangan

$$\begin{aligned}\sigma &= \frac{F}{A_0} \\ &= \frac{9710}{131,1228} \\ &= 74,05 \text{ N/mm}^2\end{aligned}$$

$$\begin{aligned}\varepsilon &= \frac{l_i - l_0}{l_0} \times 100 \\ &= \frac{\Delta l}{l_0} \times 100 \\ \varepsilon &= \frac{50,72 - 50}{50} \times 100 \\ &= \frac{0,72}{50} \times 100 \\ &= 1,44 \%\end{aligned}$$

2) Diketahui :

$$F = 4,11 \text{ KN} = (4110 \text{ N})$$

$$A_0 = 10,26 \times 13,44 = (137,8944 \text{ mm}^2)$$

$$l_i = (50,72 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,72 \text{ mm})$$

Ditanya : $\sigma =$ Tegangan Tarik (N/mm^2)

$\varepsilon =$ Regangan

$$\sigma = \frac{F}{A_0}$$

$$= \frac{4110}{137,8944}$$

$$= 29,81 \text{ N/mm}^2$$

$$\varepsilon = \frac{l_i - l_0}{l_0} \times 100$$

$$= \frac{\Delta l}{l_0} \times 100$$

$$\varepsilon = \frac{50,72 - 50}{50} \times 100$$

$$= \frac{0,72}{50} \times 100$$

$$= 1,44 \%$$

3) Diketahui :

$$F = 10,80 \text{ KN} = (10800 \text{ N})$$

$$A_0 = 10,32 \times 13,06 = (134,7792 \text{ mm}^2)$$

$$l_i = (50,30 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,30 \text{ mm})$$

Ditanya : $\sigma = \text{Tegangan Tarik (N/mm}^2\text{)}$

$\varepsilon = \text{Regangan}$

$$\sigma = \frac{F}{A_0}$$

$$= \frac{10800}{134,7792}$$

$$= 80,13 \text{ N/mm}^2$$

$$\begin{aligned}\varepsilon &= \frac{l_i - l_0}{l_0} \times 100 \\ &= \frac{\Delta l}{l_0} \times 100 \\ \varepsilon &= \frac{50,30 - 50}{50} \times 100 \\ &= \frac{0,30}{50} \times 100 \\ &= 0,60 \%\end{aligned}$$

c) Al + 3,5% Mg

1) Diketahui :

$$F = 5,78 \text{ KN} = (5780 \text{ N})$$

$$A_0 = 10,48 \times 12,90 = (135,192 \text{ mm}^2)$$

$$l_i = (50,28 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,28 \text{ mm})$$

Ditanya : $\sigma = \text{Tegangan Tarik (N/mm}^2\text{)}$

$\varepsilon = \text{Regangan}$

$$\begin{aligned}\sigma &= \frac{F}{A_0} \\ &= \frac{5780}{135,192} \\ &= 42,75 \text{ N/mm}^2\end{aligned}$$

$$\begin{aligned}\varepsilon &= \frac{l_i - l_0}{l_0} \times 100 \\ &= \frac{\Delta l}{l_0} \times 100 \\ \varepsilon &= \frac{50,28 - 50}{50} \times 100 \\ &= \frac{0,28}{50} \times 100 \\ &= 0,56 \%\end{aligned}$$

2) Diketahui :

$$F = 6,51 \text{ KN} = (6510 \text{ N})$$

$$A_0 = 10,26 \times 12,40 = (127,224 \text{ mm}^2)$$

$$l_i = (50,30 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,30 \text{ mm})$$

Ditanya : $\sigma = \text{Tegangan Tarik (N/mm}^2\text{)}$

$\varepsilon = \text{Regangan}$

$$\begin{aligned}\sigma &= \frac{F}{A_0} \\ &= \frac{6510}{127,224} \\ &= 51,17 \text{ N/mm}^2\end{aligned}$$

$$\varepsilon = \frac{l_i - l_0}{l_0} \times 100$$

$$= \frac{\Delta l}{l_0} \times 100$$

$$\varepsilon = \frac{50,30 - 50}{50} \times 100$$

$$= \frac{0,30}{50} \times 100$$

$$= 0,60 \%$$

3) Diketahui :

$$F = 8,06 \text{ KN} = (8060 \text{ N})$$

$$A_0 = 10,30 \times 10,08 = (103,824 \text{ mm}^2)$$

$$l_i = (50,28 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,28 \text{ mm})$$

Ditanya : $\sigma = \text{Tegangan Tarik (N/mm}^2\text{)}$

$\varepsilon = \text{Regangan}$

$$\sigma = \frac{F}{A_0}$$

$$= \frac{8060}{103,824}$$

$$= 77,63 \text{ N/mm}^2$$

$$\varepsilon = \frac{l_i - l_0}{l_0} \times 100$$

$$= \frac{\Delta l}{l_0} \times 100$$

$$\begin{aligned}\varepsilon &= \frac{50,28 - 50}{50} \times 100 \\ &= \frac{0,28}{50} \times 100 \\ &= 0,56 \%\end{aligned}$$

d) Al + 5,5% Mg

1) Diketahui :

$$F = 8,27 \text{ KN} = (8270 \text{ N})$$

$$A_0 = 10,12 \times 12,52 = (126,7024 \text{ mm}^2)$$

$$l_i = (50,32 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,32 \text{ mm})$$

Ditanya : $\sigma =$ Tegangan Tarik (N/mm^2)

$\varepsilon =$ Regangan

$$\begin{aligned}\sigma &= \frac{F}{A_0} \\ &= \frac{8270}{126,7024} \\ &= 65,27 \text{ N/mm}^2\end{aligned}$$

$$\begin{aligned}\varepsilon &= \frac{l_i - l_0}{l_0} \times 100 \\ &= \frac{\Delta l}{l_0} \times 100\end{aligned}$$

$$\begin{aligned}\varepsilon &= \frac{50,32 - 50}{50} \times 100 \\ &= \frac{0,32}{50} \times 100 \\ &= 0,64 \%\end{aligned}$$

2) Diketahui :

$$F = 10,18 \text{ KN} = (10180 \text{ N})$$

$$A_0 = 10,08 \times 12,60 = (127,008 \text{ mm}^2)$$

$$l_i = (50,34 \text{ mm})$$

$$l_0 = (50 \text{ mm})$$

$$\Delta l = (0,34 \text{ mm})$$

Ditanya : $\sigma =$ Tegangan Tarik (N/mm^2)

$\varepsilon =$ Regangan

$$\begin{aligned}\sigma &= \frac{F}{A_0} \\ &= \frac{10180}{127,008} \\ &= 80,15 \text{ N/mm}^2\end{aligned}$$

$$\varepsilon = \frac{l_i - l_0}{l_0} \times 100$$

$$= \frac{\Delta l}{l_0} \times 100$$

$$\varepsilon = \frac{50,34 - 50}{50} \times 100$$

$$= \frac{0,34}{50} \times 100$$

$$= 0,68 \%$$

3) Diketahui :

$$F = 5,41 \text{ KN} = (5410 \text{ N})$$

$$A_o = 10,26 \times 12,14 = (124,5564 \text{ mm}^2)$$

$$l_i = (50,36 \text{ mm})$$

$$l_o = (50 \text{ mm})$$

$$\Delta l = (0,36 \text{ mm})$$

Ditanya : $\sigma = \text{Tegangan Tarik (N/mm}^2\text{)}$

$\varepsilon = \text{Regangan}$

$$\sigma = \frac{F}{A_o}$$

$$= \frac{5410}{124,5564}$$

$$= 43,43 \text{ N/mm}^2$$

$$\varepsilon = \frac{l_i - l_o}{l_o} \times 100$$

$$= \frac{\Delta l}{l_o} \times 100$$

$$\varepsilon = \frac{50,36 - 50}{50} \times 100$$

$$= \frac{0,36}{50} \times 100$$

$$= 0,72 \%$$

C. PERHITUNGAN UJI KEKERASAN

Perhitungan uji kekerasan *brinell*

$$HB = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

Keterangan :

D = Diameter indenter (2,5mm)

d = Diameter tapak tekan (mm)

F = Gaya tekan (613 N = 62,50 kgf)

HB = *Hardness brinell*

a) Raw Material

$$1) \quad HB = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$66,4 = \frac{2 \times 62,50}{3,14 \times 2,5 (2,5 - \sqrt{2,5^2 - d^2})}$$

$$66,4 = \frac{125}{7,85 (2,5 - \sqrt{6,25 - d^2})}$$

$$66,4 \times 7,85 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$512,24 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{512,24}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,239$$

$$2,5 - 0,239 = \sqrt{6,25 - d^2}$$

$$2,261^2 = \sqrt{6,25 - d^2}$$

$$5,112 = \sqrt{6,25 - d}$$

$$d = \sqrt{6,25 - 5,112}$$

$$d = \sqrt{1,138}$$

$$d = 1,066 \text{ mm}$$

$$\begin{aligned} \text{HB} &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\ &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,066^2})} \\ &= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,136})} \\ &= \frac{125}{7,85(2,5 - \sqrt{5,114})} \\ &= \frac{125}{7,85(2,5 - 2,261)} \\ &= \frac{125}{7,85 \times 0,239} \\ &= \frac{125}{1,88} \\ &= 66,4 \text{ HB} \end{aligned}$$

$$2) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$66,4 = \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})}$$

$$66,4 = \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})}$$

$$66,4 \times 7,85 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$512,24 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{512,24}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,239$$

$$2,5 - 0,239 = \sqrt{6,25 - d^2}$$

$$2,261^2 = \sqrt{6,25 - d^2}$$

$$5,112 = \sqrt{6,25 - d}$$

$$d = \sqrt{6,25 - 5,112}$$

$$d = \sqrt{1,138}$$

$$d = 1,066 \text{ mm}$$

$$HB = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$= \frac{2 \times 62,50}{3,14 \times 2,5 (2,5 - \sqrt{2,5^2 - 1,066^2})}$$

$$= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,136})}$$

$$= \frac{125}{7,85(2,5 - \sqrt{5,114})}$$

$$= \frac{125}{7,85(2,5 - 2,261)}$$

$$= \frac{125}{7,85 \times 0,239}$$

$$= \frac{125}{1,88}$$

$$= 66,4 \text{ HB}$$

$$3) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$67,8 = \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})}$$

$$67,8 = \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})}$$

$$67,8 \times 7,85 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$532,23 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{532,23}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,234$$

$$2,5 - 0,234 = \sqrt{6,25 - d^2}$$

$$2,266^2 = \sqrt{6,25 - d^2}$$

$$5,134 = \sqrt{6,25 - d}$$

$$d = \sqrt{6,25 - 5,134}$$

$$d = \sqrt{1,116}$$

$$d = 1,056 \text{ mm}$$

$$\text{HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$= \frac{2 \times 62,50}{3,14 \times 2,5 (2,5 - \sqrt{2,5^2 - 1,056^2})}$$

$$= \frac{125}{7,85 (2,5 - \sqrt{6,25 - 1,115})}$$

$$= \frac{125}{7,85 (2,5 - \sqrt{5,135})}$$

$$= \frac{125}{7,85 (2,5 - 2,266)}$$

$$= \frac{125}{7,85 \times 0,234}$$

$$= \frac{125}{1,84}$$

$$= 67,8 \text{ HB}$$

b) Al + 1,5% Mg

$$1) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$59,2 = \frac{2 \times 62,50}{3,14 \times 2,5 (2,5 - \sqrt{2,5^2 - d^2})}$$

$$59,2 = \frac{125}{7,85 (2,5 - \sqrt{6,25 - d^2})}$$

$$59,2 \times 7,85 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$464,72 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{464,72}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,268$$

$$2,5 - 0,268 = \sqrt{6,25 - d^2}$$

$$2,232^2 = \sqrt{6,25 - d^2}$$

$$4,981 = \sqrt{6,25 - d^2}$$

$$d = \sqrt{6,25 - 4,981}$$

$$d = \sqrt{1,269}$$

$$d = 1,126 \text{ mm}$$

$$\begin{aligned} \text{HB} &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\ &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,126^2})} \\ &= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,267})} \\ &= \frac{125}{7,85(2,5 - \sqrt{4,983})} \\ &= \frac{125}{7,85(2,5 - 2,232)} \\ &= \frac{125}{7,85 \times 0,268} \\ &= \frac{125}{2,103} \\ &= 59,2 \text{ HB} \end{aligned}$$

$$2) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$61,4 = \frac{2 \times 62,50}{3,14 \times 2,5 (2,5 - \sqrt{2,5^2 - d^2})}$$

$$61,4 = \frac{125}{7,85 (2,5 - \sqrt{6,25 - d^2})}$$

$$61,4 \times 7,85 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$481,99 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{481,99}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,259$$

$$2,5 - 0,259 = \sqrt{6,25 - d^2}$$

$$2,241^2 = \sqrt{6,25 - d^2}$$

$$5,022 = \sqrt{6,25 - d}$$

$$d = \sqrt{6,25 - 5,022}$$

$$d = \sqrt{1,228}$$

$$d = 1,108 \text{ mm}$$

$$HB = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$= \frac{2 \times 62,50}{3,14 \times 2,5 (2,5 - \sqrt{2,5^2 - 1,108^2})}$$

$$= \frac{125}{7,85 (2,5 - \sqrt{6,25 - 1,227})}$$

$$= \frac{125}{7,85 (2,5 - \sqrt{5,023})}$$

$$= \frac{125}{7,85(2,5 - 2,241)}$$

$$= \frac{125}{7,85 \times 0,259}$$

$$= \frac{125}{2,033}$$

$$= 61,4 \text{ HB}$$

$$3) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$59,2 = \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})}$$

$$59,2 = \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})}$$

$$59,2 \times 7,85(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$464,72(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{464,72}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,268$$

$$2,5 - 0,268 = \sqrt{6,25 - d^2}$$

$$2,232^2 = \sqrt{6,25 - d^2}$$

$$4,981 = \sqrt{6,25 - d^2}$$

$$d = \sqrt{6,25 - 4,981}$$

$$d = \sqrt{1,269}$$

$$d = 1,126 \text{ mm}$$

$$\begin{aligned}
 HB &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\
 &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,126^2})} \\
 &= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,267})} \\
 &= \frac{125}{7,85(2,5 - \sqrt{4,983})} \\
 &= \frac{125}{7,85(2,5 - 2,232)} \\
 &= \frac{125}{7,85 \times 0,268} \\
 &= \frac{125}{2,103} \\
 &= 59,2 \text{ HB}
 \end{aligned}$$

c) Al + 3,5% Mg

$$\begin{aligned}
 1) \quad HB &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\
 61,4 &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})} \\
 61,4 &= \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})} \\
 61,4 \times 7,85 (2,5 - \sqrt{6,25 - d^2}) &= 125 \\
 481,99 (2,5 - \sqrt{6,25 - d^2}) &= 125
 \end{aligned}$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{481,99}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,259$$

$$2,5 - 0,259 = \sqrt{6,25 - d^2}$$

$$2,241^2 = \sqrt{6,25 - d^2}$$

$$5,022 = \sqrt{6,25 - d}$$

$$d = \sqrt{6,25 - 5,022}$$

$$d = \sqrt{1,228}$$

$$d = 1,108 \text{ mm}$$

$$\begin{aligned} \text{HB} &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\ &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,108^2})} \\ &= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,227})} \\ &= \frac{125}{7,85(2,5 - \sqrt{5,023})} \\ &= \frac{125}{7,85(2,5 - 2,241)} \\ &= \frac{125}{7,85 \times 0,259} \\ &= \frac{125}{2,033} \\ &= 61,4 \text{ HB} \end{aligned}$$

$$2) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$61,4 = \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})}$$

$$61,4 = \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})}$$

$$61,4 \times 7,85(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$481,99(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{481,99}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,259$$

$$2,5 - 0,259 = \sqrt{6,25 - d^2}$$

$$2,241^2 = \sqrt{6,25 - d^2}$$

$$5,022 = \sqrt{6,25 - d}$$

$$d = \sqrt{6,25 - 5,022}$$

$$d = \sqrt{1,228}$$

$$d = 1,108 \text{ mm}$$

$$\text{HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,108^2})}$$

$$= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,227})}$$

$$= \frac{125}{7,85(2,5 - \sqrt{5,023})}$$

$$= \frac{125}{7,85(2,5 - 2,241)}$$

$$= \frac{125}{7,85 \times 0,259}$$

$$= \frac{125}{2,033}$$

$$= 61,4 \text{ HB}$$

$$3) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$62,6 = \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})}$$

$$62,6 = \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})}$$

$$62,6 \times 7,85(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$491,41(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{491,41}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,254$$

$$2,5 - 0,254 = \sqrt{6,25 - d^2}$$

$$2,246^2 = \sqrt{6,25 - d^2}$$

$$5,044 = \sqrt{6,25 - d^2}$$

$$d = \sqrt{6,25 - 5,044}$$

$$d = \sqrt{1,206}$$

$$d = 1,098 \text{ mm}$$

$$\begin{aligned} \text{HB} &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\ &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,098^2})} \\ &= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,205})} \\ &= \frac{125}{7,85(2,5 - \sqrt{5,045})} \\ &= \frac{125}{7,85(2,5 - 2,246)} \\ &= \frac{125}{7,85 \times 0,254} \\ &= \frac{125}{1,994} \\ &= 62,6 \text{ HB} \end{aligned}$$

d) Al + 5,5% Mg

$$\begin{aligned} 1) \text{ HB} &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\ 65 &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})} \\ 65 &= \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})} \end{aligned}$$

$$65 \times 7,85 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$510,25 (2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{510,25}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,244$$

$$2,5 - 0,244 = \sqrt{6,25 - d^2}$$

$$2,256^2 = \sqrt{6,25 - d^2}$$

$$5,089 = \sqrt{6,25 - d}$$

$$d = \sqrt{6,25 - 5,089}$$

$$d = \sqrt{1,161}$$

$$d = 1,077 \text{ mm}$$

$$\begin{aligned} \text{HB} &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\ &= \frac{2 \times 62,50}{3,14 \times 2,5 (2,5 - \sqrt{2,5^2 - 1,077^2})} \\ &= \frac{125}{7,85 (2,5 - \sqrt{6,25 - 1,159})} \\ &= \frac{125}{7,85 (2,5 - \sqrt{5,091})} \\ &= \frac{125}{7,85 (2,5 - 2,256)} \\ &= \frac{125}{7,85 \times 0,244} \end{aligned}$$

$$= \frac{125}{1,915}$$

$$= 65 \text{ HB}$$

$$2) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$62,6 = \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})}$$

$$62,6 = \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})}$$

$$62,6 \times 7,85(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$491,41(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{491,41}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,254$$

$$2,5 - 0,254 = \sqrt{6,25 - d^2}$$

$$2,246^2 = \sqrt{6,25 - d^2}$$

$$5,044 = \sqrt{6,25 - d^2}$$

$$d = \sqrt{6,25 - 5,044}$$

$$d = \sqrt{1,206}$$

$$d = 1,098 \text{ mm}$$

$$\text{HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,098^2})}$$

$$= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,205})}$$

$$= \frac{125}{7,85(2,5 - \sqrt{5,045})}$$

$$= \frac{125}{7,85(2,5 - 2,246)}$$

$$= \frac{125}{7,85 \times 0,254}$$

$$= \frac{125}{1,994}$$

$$= 62,6 \text{ HB}$$

$$3) \text{ HB} = \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})}$$

$$65 = \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - d^2})}$$

$$65 = \frac{125}{7,85(2,5 - \sqrt{6,25 - d^2})}$$

$$65 \times 7,85(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$510,25(2,5 - \sqrt{6,25 - d^2}) = 125$$

$$2,5 - \sqrt{6,25 - d^2} = \frac{125}{510,25}$$

$$2,5 - \sqrt{6,25 - d^2} = 0,244$$

$$2,5 - 0,244 = \sqrt{6,25 - d^2}$$

$$2,256^2 = \sqrt{6,25 - d^2}$$

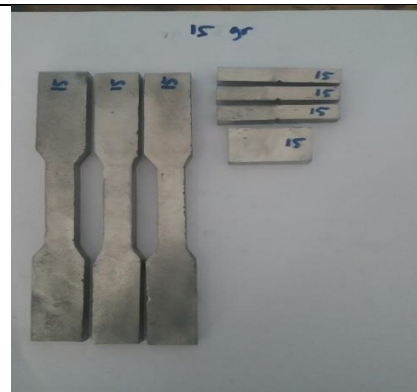
$$5,089 = \sqrt{6,25 - d^2}$$

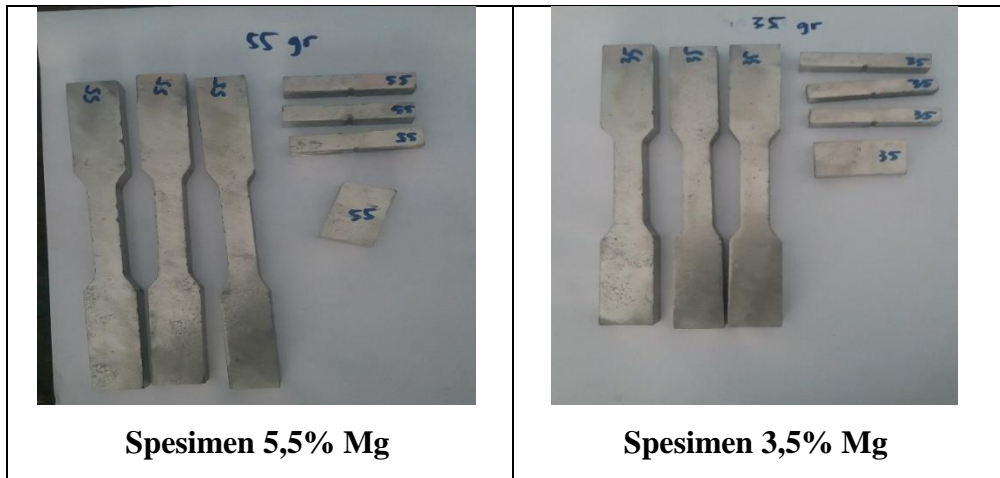
$$d = \sqrt{6,25 - 5,089}$$

$$d = \sqrt{1,161}$$

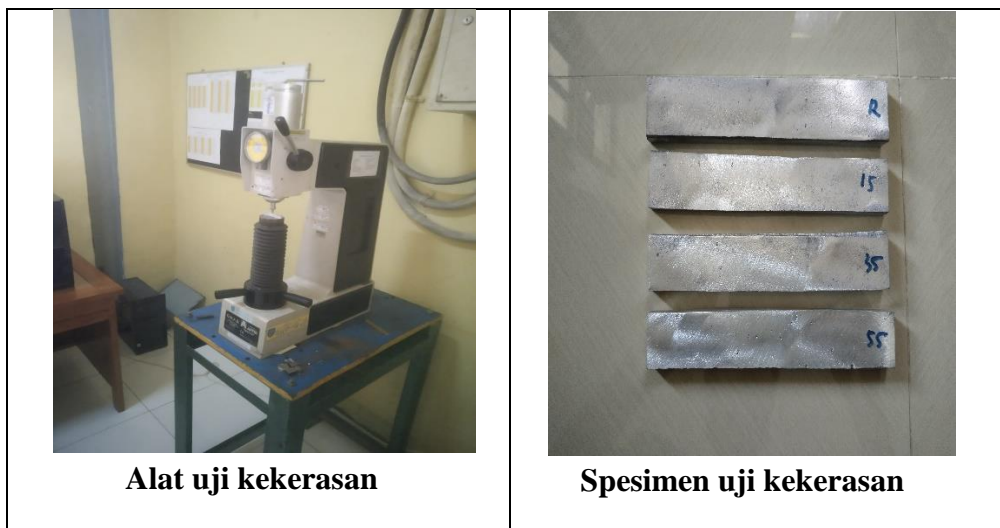
$$d = 1,077 \text{ mm}$$

$$\begin{aligned} \text{HB} &= \frac{2F}{\pi D(D - \sqrt{D^2 - d^2})} \\ &= \frac{2 \times 62,50}{3,14 \times 2,5(2,5 - \sqrt{2,5^2 - 1,077^2})} \\ &= \frac{125}{7,85(2,5 - \sqrt{6,25 - 1,159})} \\ &= \frac{125}{7,85(2,5 - \sqrt{5,091})} \\ &= \frac{125}{7,85(2,5 - 2,256)} \\ &= \frac{125}{7,85 \times 0,244} \\ &= \frac{125}{1,915} \\ &= 65 \text{ HB} \end{aligned}$$

D. PENIMBANGAN BAHAN PEMBUATAN SPESIMEN**Penimbangan piston bekas****Penimbangan Mg 1,5%****Penimbangan Mg 3,5%****Penimbangan Mg 5,5%****E. SPESIMEN YANG AKAN DIUJI****Spesimen raw material****Spesimen 1,5% Mg**



F. Pengujian kekerasan



G. Pengujian *impact*



Alat uji *impact*



Spesimen uji *impact*

H. Pengujian tarik




Alat uji tarik



Spesimen uji tarik

I. LEMBAR HASIL PENGUJIAN



LABORATORIUM BAHAN TEKNIK
DEPARTEMEN TEKNIK MESIN SEKOLAH VOKASI
UNIVERSITAS GADJAH MADA

HASIL PENGUJIAN IMPACT

No.	Variasi Spesimen	Sudut α ($^{\circ}$)	Energi (J)	Sudut β ($^{\circ}$)	Energi Terserap (J)	Luas (mm^2)	Harga Impact (J/mm^2)
1	RAW_1	151	300	147.50	5.0	107.6	0.046
2	RAW_2	151	300	148.00	4.3	100.9	0.042
3	RAW_3	151	300	147.50	5.0	103.5	0.048
4	Al+Mg 15%_1	151	300	147.75	4.6	105.5	0.044
5	Al+Mg 15%_2	151	300	148.00	4.3	111.4	0.038
6	Al+Mg 15%_3	151	300	148.50	3.5	105.0	0.034
7	Al+Mg 35%_1	151	300	148.00	4.3	110.8	0.038
8	Al+Mg 35%_2	151	300	147.75	4.6	105.3	0.044
9	Al+Mg 35%_3	151	300	148.25	3.9	104.0	0.037
10	Al+Mg 55%_1	151	300	147.75	4.6	102.3	0.045
11	Al+Mg 55%_2	151	300	148.00	4.3	107.1	0.040
12	Al+Mg 55%_3	151	300	148.00	4.3	103.5	0.041

Lembar asli, tidak untuk digandakan

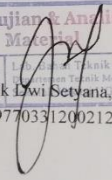
Keterangan :

1. Menggunakan metode Charpy
2. Standar benda uji mengacu ASTM E23
3. Panjang lengan 0,8 meter
4. Berat palu 20 kilogram

Identitas Penguji :

Nama : Arsalan Nabhan
NPM : 641850029
Institusi : Teknik Mesin Universitas Pancasakti Tegal

Yogyakarta, 17 Juni 2023
Staf Laboratorium Bahan Teknik


Dr. Lilik Lwi Setyana, S.T., M.T
NIP. 197703312002121002



Kampus : Jl. Grafika 2A Yogyakarta 55281



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HASIL PENGUJIAN TARIK

No.	Variasi Spesimen	Tebal (mm)	Lebar (mm)	Pmax (KN)	ΔL (mm)	Tegangan (MPa)	Regangan (%)
1	RAW_1	10.24	12.42	9.96	0.66	78.31	1.32
2	RAW_2	10.36	11.68	9.39	0.40	77.60	0.80
3	RAW_3	10.16	12.78	6.51	0.62	50.14	1.24
4	Al+Mg15_1	10.26	12.78	9.71	0.72	74.05	1.44
5	Al+Mg15_2	10.26	13.44	4.11	0.72	29.81	1.44
6	Al+Mg15_3	10.32	13.06	10.80	0.30	80.13	0.60
7	Al+Mg35_1	10.48	12.90	5.78	0.28	42.75	0.56
8	Al+Mg35_2	10.26	12.40	6.51	0.30	51.17	0.60
9	Al+Mg35_3	10.30	10.08	8.06	0.28	77.63	0.56
10	Al+Mg55_1	10.12	12.52	8.27	0.32	65.27	0.64
11	Al+Mg55_2	10.08	12.60	10.18	0.34	80.15	0.68
12	Al+Mg55_3	10.26	12.14	5.41	0.36	43.43	0.72

Keterangan:

1. Pengujian dilakukan tanggal 1 April 2023
2. Pengujian menggunakan Universal Testing Machine
3. Standar spesimen menggunakan ASTM D638

Identitas Penguji :

Nama : Arsalan Nabhan
 NPM : 6418500085
 Institusi : Teknik Mesin Universitas Pancasakti Tegal

Yogyakarta, 1 April 2023

Staf Laboratorium Bahan Teknik

Pengujian & Analisa

Mahasiswa

UGM

Departemen Teknik Mesin

Sekolah Vokasi UGM

Dr. Lilik Dwi Setyana, S.T., M.T

NIP. 197703312002121002

Lembar asli, tidak untuk digandakan



DINAS PERINDUSTRIAN, TRANSMIGRASI DAN TENAGA KERJA
KABUPATEN TEGAL

UPTD LABORATORIUM PERINDUSTRIAN

Komplek LIK Takaru Jl. Raya Dampyak KM 4 Tegal Telp/Fax : (0283) 357437
Email : labperintgl@gmail.com website : lab.disperinnaker.tegalkab.go.id



LAPORAN UJI KEKERASAN

Laporan No. : 05/2023.98/H/21 Benda Uji : Sesuai JIS Z 2243 : 2008
Pemakai Jasa : ARSALAN NABHAN Objek uji : **Aluminium (Raw Material)**
Alamat : Universitas Pancasakti Tegal - Metode Uji : JIS Z 2243 : 2008
Tegal
Suhu : 25 °C Mesin Uji : Affri 206 RT
Tgl. Terima : 22 Mei 2023 Jml. Specimen : 1 Pc
Tgl. Pengujian : 23 Mei 2023 Halaman : 1 dari 1

HASIL UJI :

No.	Kode Sampel uji	Parameter uji	Hasil uji		Satuan	Keterangan
			Daerah Uji	Nilai Kekerasan		
1.	21.4 ¹⁾	Kekerasan Brinell	Titik 1	66,4	HB	- Beban penekanan F = 613 N - Waktu penekanan 15 detik - Indentor Ø 2,5 mm
			Titik 2	66,4		
			Titik 3	67,8		
			Rata-rata	66,9		

Keterangan :

1) $U_{95} = 66,9 \pm 1,47$

U_{95} / Ketidakpastian pengukuran tersebut diukur pada tingkat kepercayaan 95% dengan faktor cakupan (k) = 2

Tegal, 23 Mei 2023
Manajer Teknis

EKO SUPRIYANTO, S.T.
NIP. 19741231 200604 1 093

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DINAS PERINDUSTRIAN, TRANSMIGRASI DAN TENAGA KERJA
KABUPATEN TEGAL

UPTD LABORATORIUM PERINDUSTRIAN

Komplek LIK Takaru Jl. Raya Dampyak KM 4 Tegal Telp/Fax : (0283) 357437
Email : labperintgl@gmail.com website : lab.disperinnaker.tegalkab.go.id



LAPORAN UJI KEKERASAN

Laporan No. : 05/2023.98/H/21 Benda Uji : Sesuai JIS Z 2243 : 2008
Pemakai Jasa : ARSALAN NABHAN Objek uji : **Aluminium (Al + 15 gram Mg)**
Alamat : Universitas Pancasakti Tegal - Metode Uji : JIS Z 2243 : 2008
Suhu : 25 °C Mesin Uji : Affri 206 RT
Tgl. Terima : 22 Mei 2023 Jml. Specimen : 1 Pc
Tgl. Pengujian : 23 Mei 2023 Halaman : 1 dari 1

HASIL UJI :

No.	Kode Sampel uji	Parameter uji	Hasil uji		Satuan	Keterangan
			Daerah Uji	Nilai Kekerasan		
1.	21.1 ¹⁾	Kekerasan Brinell	Titik 1	59,2	HB	- Beban penekanan F = 613 N - Waktu penekanan 15 detik - Indentor Ø 2,5 mm
			Titik 2	61,4		
			Titik 3	59,2		
			Rata-rata	59,9		

Keterangan :

1) $U_{95} = 59,9 \pm 1,85$

U_{95} / Ketidakpastian pengukuran tersebut diukur pada tingkat kepercayaan 95% dengan faktor cakupan (k) = 2

Tegal, 23 Mei 2023
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LAPORAN UJI KEKERASAN

Laporan No. : 05/2023.98/H/21 Benda Uji : Sesuai JIS Z 2243 : 2008
Pemakai Jasa : ARSALAN NABHAN Objek uji : **Aluminium (Al + 35 gram Mg)**
Alamat : Universitas Pancasakti Tegal - Metode Uji : JIS Z 2243 : 2008
Tegal
Suhu : 25 °C Mesin Uji : Affri 206 RT
Tgl. Terima : 22 Mei 2023 Jml. Specimen : 1 Pc
Tgl. Pengujian : 23 Mei 2023 Halaman : 1 dari 1

HASIL UJI :

No.	Kode Sampel uji	Parameter uji	Hasil uji		Satuan	Keterangan
			Daerah Uji	Nilai Kekerasan		
1.	21.2 ¹⁾	Kekerasan Brinell	Titik 1	61,4	HB	- Beban penekanan F = 613 N - Waktu penekanan 15 detik - Indentor Ø 2,5 mm
			Titik 2	61,4		
			Titik 3	62,6		
			Rata-rata	61,8		

Keterangan :

1) $U_{95} = 61,8 \pm 1,39$

U_{95} / Ketidakpastian pengukuran tersebut diukur pada tingkat kepercayaan 95% dengan faktor cakupan (k) = 2

Tegal, 23 Mei 2023
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