

**Tabel Lampiran 1** Besarnya Kelonggaran Berdasarkan Faktor-Faktor Yang Berpengaruh (lanjutan)

Faktor	Contoh Pekerjaan	Kelonggaran (%)	
<b>C. Gerakan kerja</b>			
1. Normal	Ayunan bebas dari palu	0	
2. Agak terbatas	Ayunan terbatas dari palu	0-5	
3. Sulit	Membawa beban berat dengan satu tangan	0-5	
4. Pada anggota-anggota badan terbatas	Bekerja dengan tangan diatas kepala	5-10	
5. Seluruh anggota badan terbatas	Bekerja dilorong pertambangan yang sempit	10-15	
<b>D. Kelelahan mata *)</b>			
1. Pandangan yang terputus-putus	Membawa alat ukur	0.0-6.0	0.0-6.0
2. Pandangan yang hampir terus menerus	Pekerjaan-pekerjaan yang teliti	6.0-7.5	6.0-7.5
3. Pandangan terus menerus dengan fokus	Memeriksa cacat-cacat pada kain	7.5-12.0	7.5-16.0
berubah ubah		12.0-19.0	16.0-30.0
4. Pandangan terus menerus dengan focus	Pemeriksaan yang sangat teliti	19.0-30.0	
tetap		30.0-50.0	

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Faktor	Contoh Pekerjaan	Kelonggaran (%)	
<b>E. Keadaan temperatur tempat kerja **)</b>	Temperatur (°C)	Kelelahan normal	Berlebihan
1. Beku	dibawah 0	diatas 10	diatas 12
2. Rendah	0-13	10-0	12-5
3. Sedang	13-22	5-0	8-0
4. Normal	22-28	0-5	0-8
5. Tinggi	28-38	5-40	8-100
6. Sangat tinggi	diatas 38	diatas 40	diatas 100
<b>F. Keadaan atmosfer ***)</b>			
1. Baik	Ruang yang berventilasi baik, udara segar	0	
2. Cukup	Ventilasi kurang baik, ada bau-bauan (tidak berbahaya)	0-5	
3. Kurang baik	Adanya debu-debu beracun, atau tidak beracun tetapi banyak	5-10	
4. Buruk	Adanya bau-bauan berbahaya yang mengharuskan menggunakan alat alat pernapasan	10-20	

**Tabel Lampiran 1** Besarnya Kelonggaran Berdasarkan Faktor-Faktor Yang Berpengaruh (lanjutan)

Faktor	Kelonggaran (%)
<b>G. Keadaan lingkungan yang baik</b>	
1. Bersih, sehat, cerah dengan kebisingan rendah	0
2. Siklus kerja berulang-ulang antara 5-10 detik	0-1
3. Siklus kerja berulang-ulang antara 0-5 detik	1-3
4. Sangat bising	0-5
5. Jika faktor-faktor yang berpengaruh dapat menurunkan kualitas	0-5
6. Terasa adanya getaran lantai	5-10
7. Keadaan-keadaan yang luar biasa (bunyi, kebersihan, dll)	5-15

\*) Kontras antara warna hendaknya diperhatikan

\*\*) Tergantung juga pada keadaan ventilasi

\*\*\*) Dipengaruhi juga pada ketinggian tempat kerja dari permukaan laut dan keadaan iklim

Catatan pelengkap : kelonggaran untuk kebutuhan pribadi bagi : - Pria = 0 {2.5%

- Wanita = 2-5.0%

**Lanjutan Perhitungan Uji Keseragaman Dan Kecukupan Data  
Jarak Antar Mesin**

**1. Ruang Operator – Ammonia Reservoir (S-2)**

**Tabel Lampiran 3.1 (S-2)**

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	56.53	56.70	56.43	55.90	56.78	282.34	56.47
2	55.47	56.35	56.32	56.88	56.36	281.38	56.28
						563.72	112.74

**Uji Keseragaman Data**

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{112.74}{2} = 56.37$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(56.63 - 56.37)^2 + (56.70 - 56.37)^2 + \dots + (56.36 - 56.37)^2}{10 - 1}}$$

$$\sigma = 0.42$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma_{\bar{x}} = \frac{0.42}{\sqrt{2}} = 0.30$$

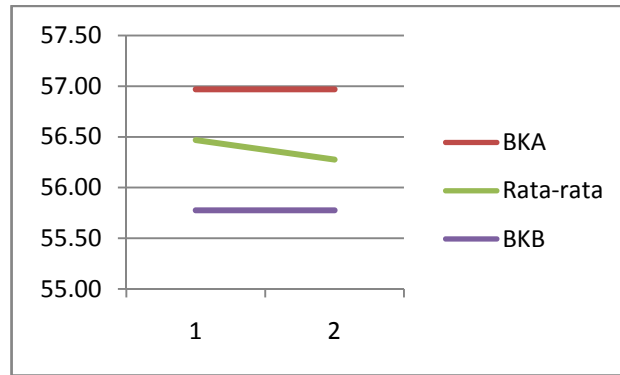
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 56.37 + (2 \times 0.30) = 56.97$$

$$BKB = 56.37 - (2 \times 0.30) = 55.78$$

**Tabel Lampiran 3.2** Nilai Batas Kendali (S-2)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	56.97	56.47	55.78	Seragam
2	56.97	56.28	55.78	Seragam

**Gambar Lampiran 3.1** Grafik BKA dan BKB (S-2)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(56.53^2 + 56.70^2 + 56.43^2 + \dots + 56.36^2)} - (563.72)^2}{563.72} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(31779.95)} - 317783.51}{563.72} \right)^2$$

$$N' = \left( \frac{40\sqrt{317799.49} - 317783.51}{563.72} \right)^2$$

$$N' = \left( \frac{40\sqrt{15.98}}{563.72} \right)^2$$

$$N' = \left( \frac{40 \times 3.99}{563.72} \right)^2$$

$$N' = \left( \frac{159.89}{308.40} \right)^2$$

$$N' = 0.28^2$$

$$N' = 0.08 \rightarrow N' \leq N, \text{ data mencukupi}$$

## 2. Ruang Operator – Booster Compressor (S-3)

**Tabel Lampiran 3.3 (S-3)**

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	40.98	40.90	39.86	40.53	40.70	202.97	40.59
2	40.51	39.80	40.80	40.53	40.99	202.63	40.52
						405.61	81.11

### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{81.11}{2} = 40.56$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(40.98 - 40.56)^2 + (40.90 - 40.56)^2 + \dots + (40.99 - 40.56)^2}{10 - 1}}$$

$$\sigma = 0.43$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.43}{\sqrt{2}} = 0.30$$

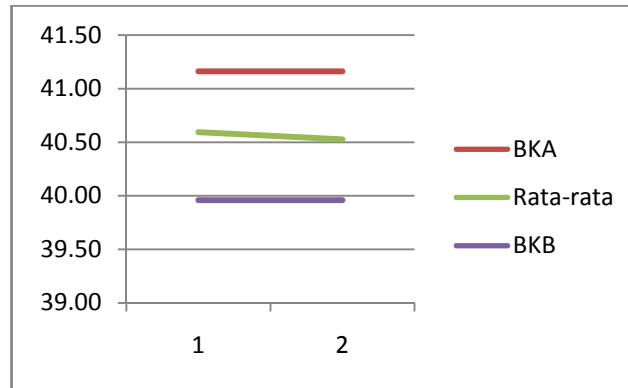
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 40.56 + (2 \times 0.30) = 41.16$$

$$BKB = 40.56 - (2 \times 0.30) = 39.96$$

**Tabel Lampiran 3.4** Nilai Batas Kendali (S-3)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	41.16	40.59	39.96	Seragam
2	41.16	40.52	39.96	Seragam

**Gambar Lampiran 3.2** Grafik BKA dan BKB (S-3)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(40.98^2 + 40.90^2 + 39.86^2 + \dots + 40.99^2)} - (405.61)^2}{405.61} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(16453.21) - 164515.82}}{405.61} \right)^2$$

$$N' = \left( \frac{40\sqrt{164532.10 - 164515.82}}{405.61} \right)^2$$

$$N' = \left( \frac{40\sqrt{16.28}}{405.61} \right)^2$$

$$N' = \left( \frac{40 \times 4.03}{405.61} \right)^2$$

$$N' = \left( \frac{161.2}{405.61} \right)^2$$

$$N' = 0.40^2$$

$N' = 0.16 \rightarrow N' \leq N$ , data mencukupi

### 3. Ruang Operator – Compressor (S-4)

**Tabel Lampiran 3.5 (S-4)**

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	37.87	37.68	37.51	37.44	36.88	187.39	37.48
2	37.17	37.02	37.51	37.54	37.77	187.00	37.40
						374.39	74.88

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{74.88}{2} = 37.44$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(37.87 - 37.44)^2 + (37.68 - 37.44)^2 + \dots + (37.77 - 37.44)^2}{10 - 1}}$$

$$\sigma = 0.32$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma_{\bar{x}} = \frac{0.32}{\sqrt{2}} = 0.23$$

- Nilai batas kendali atas dan batas kendali bawah:

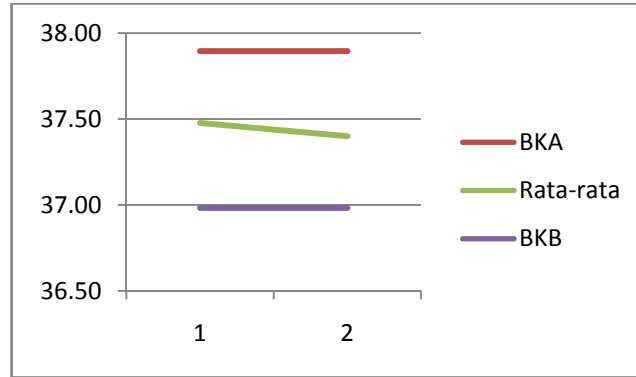
$$BKA = 37.44 + (2 \times 0.23) = 37.90$$

$$BKB = 37.44 - (2 \times 0.23) = 36.98$$



**Tabel Lampiran 3.6** Nilai Batas Kendali (S-4)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	37.90	37.48	36.98	Seragam
2	37.90	37.40	36.98	Seragam

**Gambar Lampiran 3.3** Grafik BKA dan BKB (S-4)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(37.87^2 + 37.68^2 + 37.51^2 + \dots + 37.77^2)} - (374.39)^2}{374.39} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(14017.70)} - 140167.65}{374.39} \right)^2$$

$$N' = \left( \frac{40\sqrt{140177.02} - 140167.65}{374.39} \right)^2$$

$$N' = \left( \frac{40\sqrt{9.37}}{374.39} \right)^2$$

$$N' = \left( \frac{40 \times 3.06}{374.39} \right)^2$$

$$N' = \left( \frac{122.4}{374.39} \right)^2$$

$$N' = 0.32^2$$

$N' = 0.11 \rightarrow N' \leq N$ , data mencukupi

#### 4. Ruang Operator – Ammonia Preheater (S-5)

Tabel Lampiran 3.7 (S-5)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	73.34	73.15	72.17	71.54	72.35	362.55	72.51
2	72.19	72.69	73.42	72.68	72.86	363.85	72.77
						726.40	145.28

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{145.28}{2} = 72.64$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(73.34 - 72.64)^2 + (73.15 - 72.64)^2 + \dots + (72.86 - 72.64)^2}{10 - 1}}$$

$$\sigma = 0.59$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.59}{\sqrt{2}} = 0.42$$

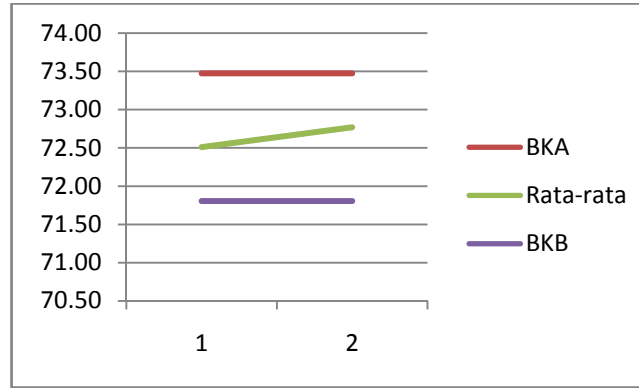
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 72.64 + (2 \times 0.42) = 73.47$$

$$BKB = 72.64 - (2 \times 0.42) = 71.81$$

**Tabel Lampiran 3.8** Nilai Batas Kendali (S-5)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	73.47	72.51	71.81	Seragam
2	73.47	72.77	71.81	Seragam

**Gambar Lampiran 3.4** Grafik BKA dan BKB (S-5)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(73.34^2 + 73.15^2 + 72.17^2 + \dots + 72.86^2)} - (726.40)^2}{726.40} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(52768.96)} - 527658.27}{726.40} \right)^2$$

$$N' = \left( \frac{40\sqrt{527689.63} - 527658.27}{726.40} \right)^2$$

$$N' = \left( \frac{40\sqrt{31.36}}{726.40} \right)^2$$

$$N' = \left( \frac{40 \times 5.60}{726.40} \right)^2$$

$$N' = \left( \frac{224}{726.40} \right)^2$$

$$N' = 0.31^2$$

$N' = 0.10 \rightarrow N' \leq N$ , data mencukupi

#### 5. Knockout Drum – Ammonia Reservoir (1-2)

**Tabel Lampiran 3.9 (1-2)**

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	34.50	33.70	33.80	34.74	34.71	171.45	34.29
2	34.93	35.62	34.95	34.98	33.96	174.44	34.89
						345.88	69.18

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{69.18}{2} = 34.59$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(34.50 - 34.59)^2 + (33.70 - 34.59)^2 + \dots + (33.96 - 34.59)^2}{10 - 1}}$$

$$\sigma = 0.61$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma_{\bar{x}} = \frac{0.61}{\sqrt{2}} = 0.43$$

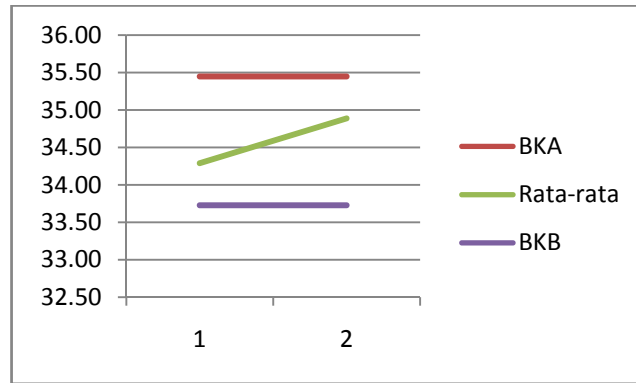
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 34.59 + (2 \times 0.43) = 35.45$$

$$BKB = 34.59 - (2 \times 0.43) = 33.73$$

**Tabel Lampiran 3.10** Nilai Batas Kendali (1-2)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	35.45	34.29	33.73	Seragam
2	35.45	34.89	33.73	Seragam

**Gambar Lampiran 3.5** Grafik BKA dan BKB (1-2)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(34.50^2 + 33.70^2 + 33.80^2 + \dots + 33.96^2) - (345.88)^2}}{345.88} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(11966.76) - 119634.29}}{345.88} \right)^2$$

$$N' = \left( \frac{40\sqrt{119667.56 - 119634.29}}{345.88} \right)^2$$

$$N' = \left( \frac{40\sqrt{33.27}}{345.88} \right)^2$$

$$N' = \left( \frac{40 \times 5.77}{345.88} \right)^2$$

$$N' = \left( \frac{230.8}{345.88} \right)^2$$

$$N' = 0.66^2$$

$$N' = 0.44 \rightarrow N' \leq N, \text{ data mencukupi}$$

#### 6. Knockout Drum – Booster Compressor (1-3)

Tabel Lampiran 3.11 (1-3)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	30.21	29.35	31.10	30.36	30.05	151.07	30.21
2	30.67	31.74	30.83	31.08	29.66	153.97	30.79
						305.04	61

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{61}{2} = 30.50$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(30.21 - 30.50)^2 + (29.35 - 30.50)^2 + \dots + (29.66 - 30.50)^2}{10 - 1}}$$

$$\sigma = 0.72$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.72}{\sqrt{2}} = 0.51$$

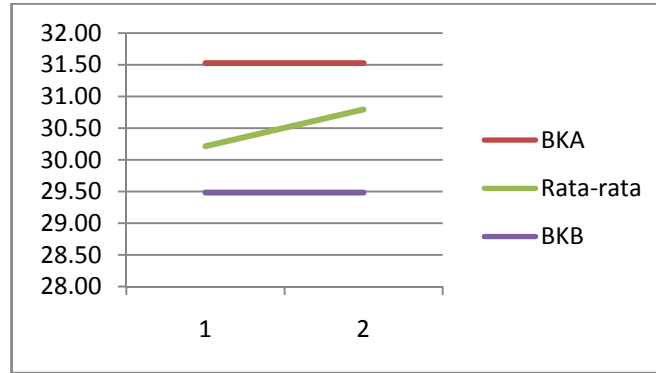
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 30.50 + (2 \times 0.51) = 31.53$$

$$BKB = 30.50 - (2 \times 0.51) = 29.48$$

**Tabel Lampiran 3.12** Nilai Batas Kendali (1-3)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	31.53	30.21	29.48	Seragam
2	31.53	30.79	29.48	Seragam

**Gambar Lampiran 3.6** Grafik BKA dan BKB (1-3)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(30.21^2 + 29.35^2 + 31.10^2 + \dots + 29.66^2)} - (305.04)^2}{305.04} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(9309.88)} - 93051.84}{305.04} \right)^2$$

$$N' = \left( \frac{40\sqrt{93098.82} - 93051.84}{305.04} \right)^2$$

$$N' = \left( \frac{40\sqrt{46.98}}{305.04} \right)^2$$

$$N' = \left( \frac{40 \times 6.85}{305.04} \right)^2$$

$$N' = \left( \frac{274}{305.04} \right)^2$$

$$N' = 0.89^2$$

$$N' = 0.81 \rightarrow N' \leq N, \text{ data mencukupi}$$

#### 7. Knockout Drum – Compressor (1-4)

Tabel Lampiran 3.13 (1-4)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	27.42	28.69	27.70	28.70	27.32	139.82	27.96
2	26.84	27.71	26.84	28.22	28.71	138.32	27.66
						278.13	55.62

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{55.62}{2} = 27.81$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(27.42 - 27.81)^2 + (28.69 - 27.81)^2 + \dots + (28.71 - 27.81)^2}{10 - 1}}$$

$$\sigma = 0.73$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.73}{\sqrt{2}} = 0.52$$

- Nilai batas kendali atas dan batas kendali bawah:

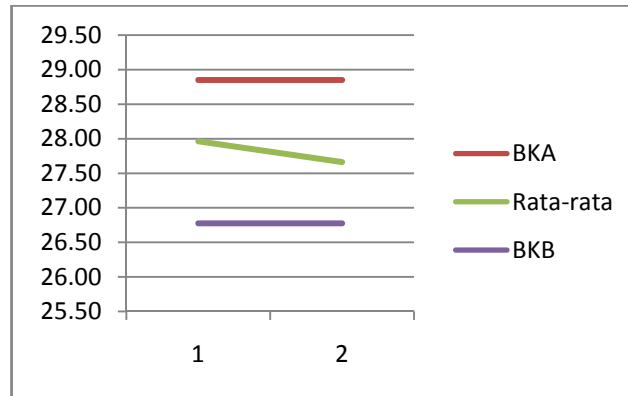
$$BKA = 27.81 + (2 \times 0.52) = 28.85$$

$$BKB = 27.81 - (2 \times 0.52) = 26.78$$



**Tabel Lampiran 3.14** Nilai Batas Kendali (1-4)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	28.85	27.96	26.78	Seragam
2	28.85	27.66	26.78	Seragam

**Gambar Lampiran 3.7** Grafik BKA dan BKB (1-4)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(27.42^2 + 28.69^2 + 27.70^2 + \dots + 28.71^2)} - (278.13)^2}{278.13} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(7740.70)} - 77358.58}{278.13} \right)^2$$

$$N' = \left( \frac{40\sqrt{77407.04} - 77358.58}{278.13} \right)^2$$

$$N' = \left( \frac{40\sqrt{48.46}}{278.13} \right)^2$$

$$N' = \left( \frac{40 \times 6.96}{278.13} \right)^2$$

$$N' = \left( \frac{278.4}{278.13} \right)^2$$

$$N' = 1^2$$

$N' = 1 \rightarrow N' \leq N$ , data mencukupi

### 8. Knockout Drum – Ammonia Preheater (1-5)

**Tabel Lampiran 3.15 (1-5)**

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	34.26	33.53	34.37	34.35	33.75	170.26	34.05
2	34.61	34.40	34.56	33.83	34.47	171.88	34.38
						342.14	68.43

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{68.43}{2} = 34.21$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(34.26 - 34.21)^2 + (33.53 - 34.21)^2 + \dots + (34.47 - 34.21)^2}{10 - 1}}$$

$$\sigma = 0.37$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma_{\bar{x}} = \frac{0.37}{\sqrt{2}} = 0.26$$

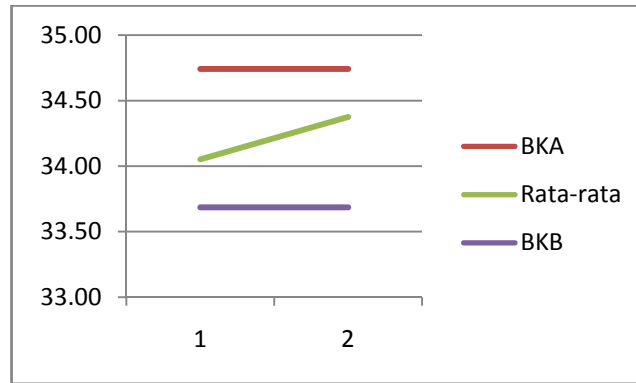
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 34.21 + (2 \times 0.26) = 34.74$$

$$BKB = 34.21 - (2 \times 0.26) = 33.69$$

**Tabel Lampiran 3.16** Nilai Batas Kendali (1-5)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	34.74	34.05	33.69	Seragam
2	34.74	34.38	33.69	Seragam

**Gambar Lampiran 3.8** Grafik BKA dan BKB (1-5)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(34.26^2 + 33.53^2 + 34.37^2 + \dots + 34.47^2) - (342.14)^2}}{342.14} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(11706.97) - 117057.11}}{342.14} \right)^2$$

$$N' = \left( \frac{40\sqrt{117069.65 - 117057.11}}{342.14} \right)^2$$

$$N' = \left( \frac{40\sqrt{12.54}}{342.14} \right)^2$$

$$N' = \left( \frac{40 \times 3.54}{342.14} \right)^2$$

$$N' = \left( \frac{141.6}{342.14} \right)^2$$

$$N' = 0.41^2$$

$$N' = 0.17 \rightarrow N' \leq N, \text{ data mencukupi}$$

### 9. Ammonia Reservoir – Booster Compressor (2-3)

**Tabel Lampiran 3.17 (2-3)**

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	63.16	63.38	63.41	62.83	63.25	316.02	63.20
2	62.81	62.41	63.67	63.75	63.51	316.15	63.23
						632.16	126.43

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{126.43}{2} = 63.22$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(63.16 - 63.22)^2 + (63.38 - 63.22)^2 + \dots + (63.51 - 63.22)^2}{10 - 1}}$$

$$\sigma = 0.42$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.42}{\sqrt{2}} = 0.30$$

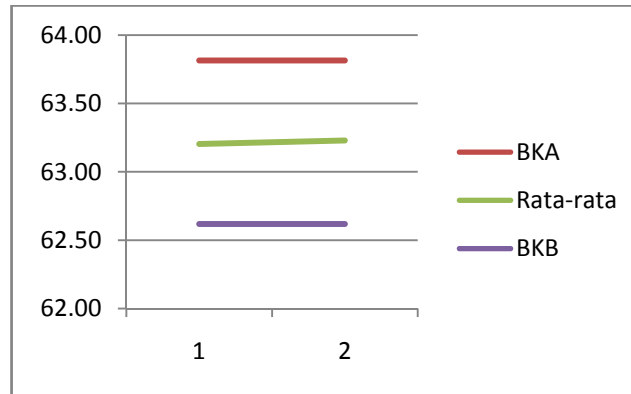
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 63.22 + (2 \times 0.30) = 63.81$$

$$BKB = 63.22 - (2 \times 0.30) = 62.62$$

**Tabel Lampiran 3.18** Nilai Batas Kendali (2-3)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	63.81	63.20	62.62	Seragam
2	63.81	63.23	62.62	Seragam

**Gambar Lampiran 3.9** Grafik BKA dan BKB (2-3)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(63.16^2 + 63.38^2 + 63.41^2 + \dots + 63.51^2)} - (632.16)^2}{632.16} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(39964.83)} - 399632.21}{632.16} \right)^2$$

$$N' = \left( \frac{40\sqrt{399648.28} - 399632.21}{632.16} \right)^2$$

$$N' = \left( \frac{40\sqrt{16.07}}{632.16} \right)^2$$

$$N' = \left( \frac{40 \times 4.01}{632.16} \right)^2$$

$$N' = \left( \frac{160.4}{632.16} \right)^2$$

$$N' = 0.25^2$$

$$N' = 0.06 \rightarrow N' \leq N, \text{ data mencukupi}$$

#### 10. Ammonia Reservoir – Compressor (2-4)

Tabel Lampiran 3.19 (2-4)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	55.95	55.70	56.51	55.25	55.86	279.29	55.86
2	56.23	54.99	55.64	55.80	55.59	278.25	55.65
						557.53	111.51

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{111.51}{2} = 55.75$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(55.95 - 55.75)^2 + (55.70 - 55.75)^2 + \dots + (55.59 - 55.75)^2}{10 - 1}}$$

$$\sigma = 0.44$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.44}{\sqrt{2}} = 0.31$$

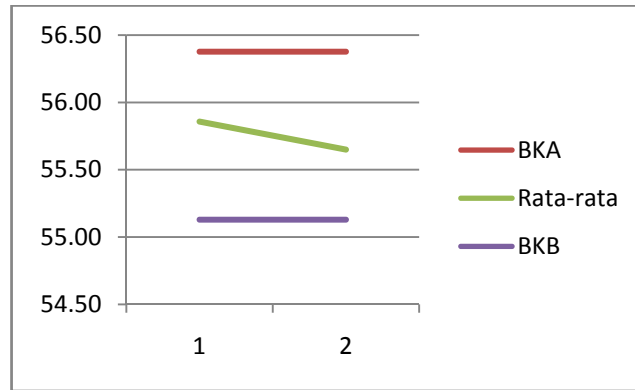
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 55.75 + (2 \times 0.31) = 56.38$$

$$BKB = 55.75 - (2 \times 0.31) = 55.13$$

**Tabel Lampiran 3.20** Nilai Batas Kendali (2-4)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	56.38	55.86	55.13	Seragam
2	56.38	55.65	55.13	Seragam

**Gambar Lampiran 3.10** Grafik BKA dan BKB (2-4)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(55.95^2 + 55.70^2 + 56.51^2 + \dots + 55.59^2)} - (557.53)^2}{557.53} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(31085.80)} - 310840.48}{557.53} \right)^2$$

$$N' = \left( \frac{40\sqrt{310857.98} - 310840.48}{557.53} \right)^2$$

$$N' = \left( \frac{40\sqrt{17.50}}{557.53} \right)^2$$

$$N' = \left( \frac{40 \times 4.18}{557.53} \right)^2$$

$$N' = \left( \frac{167.2}{557.53} \right)^2$$

$$N' = 0.30^2$$

$$N' = 0.09 \rightarrow N' \leq N, \text{ data mencukupi}$$

### 11. Ammonia Reservoir – Ammonia Preheater (2-5)

Tabel Lampiran 3.21 (2-5)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	11.93	12.48	12.50	12.59	12.23	61.73	12.35
2	11.79	13.31	12.11	12.79	11.94	61.93	12.39
						123.66	24.74

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{24.74}{2} = 12.37$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(11.93 - 12.37)^2 + (12.48 - 12.37)^2 + \dots + (11.94 - 12.37)^2}{10 - 1}}$$

$$\sigma = 0.46$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.46}{\sqrt{2}} = 0.33$$

- Nilai batas kendali atas dan batas kendali bawah:

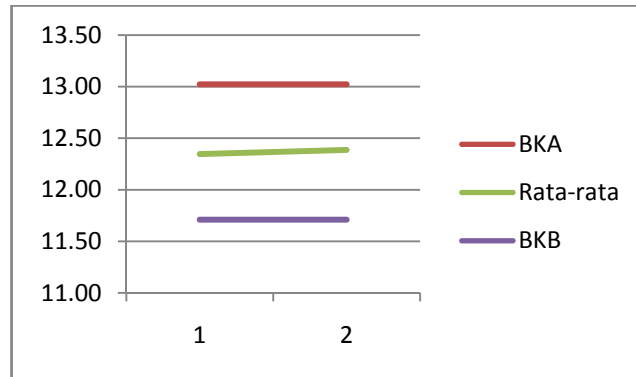
$$BKA = 12.37 + (2 \times 0.33) = 13.02$$

$$BKB = 12.37 - (2 \times 0.33) = 11.71$$



**Tabel Lampiran 3.22** Nilai Batas Kendali (2-5)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	13.02	12.35	11.71	Seragam
2	13.02	12.39	11.71	Seragam

**Gambar Lampiran 3.11** Grafik BKA dan BKB (2-5)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(11.93^2 + 12.48^2 + 12.50^2 + \dots + 11.94^2)} - (123.66)^2}{123.66} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(1531.08)} - 15291.38}{123.66} \right)^2$$

$$N' = \left( \frac{40\sqrt{15210.77} - 15291.38}{123.66} \right)^2$$

$$N' = \left( \frac{40\sqrt{19.39}}{123.66} \right)^2$$

$$N' = \left( \frac{40 \times 4.40}{123.66} \right)^2$$

$$N' = \left( \frac{176}{123.66} \right)^2$$

$$N' = 1.42^2$$

$N' = 2.03 \rightarrow N' \leq N$ , data mencukupi

## 12. Booster Compressor – Compressor (3-4)

**Tabel Lampiran 3.23 (3-4)**

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	4.88	5.52	5.59	4.81	5.54	26.34	5.27
2	5.12	5.69	5.14	5.37	5.45	26.77	5.35
						53.11	10.62

### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{10.62}{2} = 5.31$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(4.88 - 5.31)^2 + (5.52 - 5.31)^2 + \dots + (5.45 - 5.31)^2}{10 - 1}}$$

$$\sigma = 0.31$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.31}{\sqrt{2}} = 0.22$$

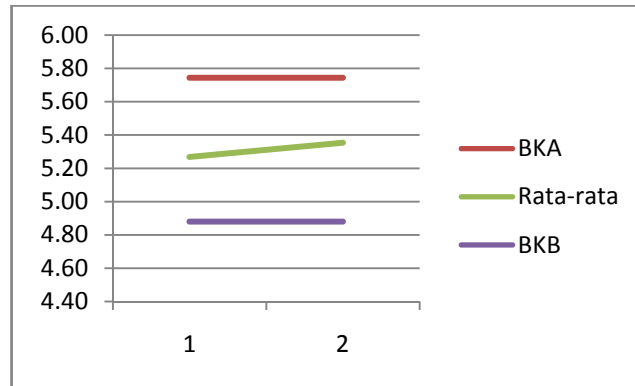
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 5.31 + (2 \times 0.22) = 5.74$$

$$BKB = 5.31 - (2 \times 0.22) = 4.88$$

**Tabel Lampiran 3.24** Nilai Batas Kendali (3-4)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	5.74	5.27	4.88	Seragam
2	5.74	5.35	4.88	Seragam

**Gambar Lampiran 3.12** Grafik BKA dan BKB (3-4)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(4.88^2 + 5.52^2 + 5.59^2 + \dots + 5.45^2)} - (53.11)^2}{53.11} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(282.90)} - 2820.54}{53.11} \right)^2$$

$$N' = \left( \frac{40\sqrt{2828.97} - 2820.54}{53.11} \right)^2$$

$$N' = \left( \frac{40\sqrt{8.43}}{53.11} \right)^2$$

$$N' = \left( \frac{40 \times 2.90}{53.11} \right)^2$$

$$N' = \left( \frac{116}{53.11} \right)^2$$

$$N' = 2.18^2$$

$$N' = 4.78 \rightarrow N' \leq N, \text{ data mencukupi}$$

### 13. Booster Compressor – Ammonia Preheater (3-5)

Tabel Lampiran 3.25 (3-5)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	29.41	29.46	29.05	29.14	28.64	145.69	29.14
2	29.03	29.21	29.02	29.18	28.14	144.58	28.92
						290.27	58.06

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{58.06}{2} = 29.03$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(29.41 - 29.03)^2 + (29.46 - 29.03)^2 + \dots + (28.14 - 29.03)^2}{10 - 1}}$$

$$\sigma = 0.38$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.38}{\sqrt{2}} = 0.27$$

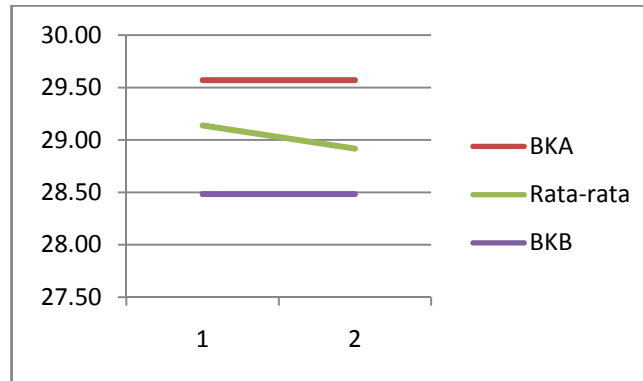
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 29.03 + (2 \times 0.27) = 29.57$$

$$BKB = 29.03 - (2 \times 0.27) = 28.48$$

**Tabel Lampiran 3.26** Nilai Batas Kendali (3-5)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	29.57	29.14	28.48	Seragam
2	29.57	28.92	28.48	Seragam

**Gambar Lampiran 3.13** Grafik BKA dan BKB (3-5)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(29.41^2 + 29.46^2 + 29.05^2 + \dots + 28.14^2) - (290.27)^2}}{290.27} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(8427.20) - 84258.70}}{290.27} \right)^2$$

$$N' = \left( \frac{40\sqrt{84271.99 - 84258.70}}{290.27} \right)^2$$

$$N' = \left( \frac{40\sqrt{13.29}}{290.27} \right)^2$$

$$N' = \left( \frac{40 \times 3.65}{290.27} \right)^2$$

$$N' = \left( \frac{146}{290.27} \right)^2$$

$$N' = 0.50^2$$

$$N' = 0.25 \rightarrow N' \leq N, \text{ data mencukupi}$$

#### 14. Compressor – Ammonia Preheater (4-5)

Tabel Lampiran 3.27 (4-5)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	29.04	28.44	28.85	26.58	28.23	141.15	28.23
2	28.42	28.63	27.93	28.48	27.74	141.21	28.24
						282.36	56.47

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{56.47}{2} = 28.24$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(29.04 - 28.24)^2 + (28.44 - 28.24)^2 + \dots + (27.74 - 28.24)^2}{10 - 1}}$$

$$\sigma = 0.70$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.70}{\sqrt{2}} = 0.49$$

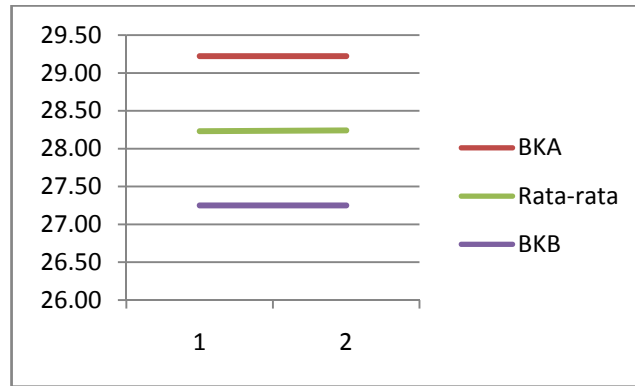
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 28.24 + (2 \times 0.49) = 29.22$$

$$BKB = 28.24 - (2 \times 0.49) = 27.25$$

**Tabel Lampiran 3.28** Nilai Batas Kendali (4-5)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	29.22	28.23	27.25	Seragam
2	29.22	28.24	27.25	Seragam

**Gambar Lampiran 3.14** Grafik BKA dan BKB (4-5)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(29.04^2 + 28.44^2 + 28.85^2 + \dots + 27.74^2)} - (282.36)^2}{282.36} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(7976.95)} - 79725.64}{282.36} \right)^2$$

$$N' = \left( \frac{40\sqrt{79769.47} - 79725.64}{282.36} \right)^2$$

$$N' = \left( \frac{40\sqrt{43.82}}{282.36} \right)^2$$

$$N' = \left( \frac{40 \times 6.62}{282.36} \right)^2$$

$$N' = \left( \frac{264.8}{282.36} \right)^2$$

$$N' = 0.93^2$$

$$N' = 0.88 \rightarrow N' \leq N, \text{ data mencukupi}$$

### 15. Ammonia Preheater – Urea Synthetic Reactor (5-6)

Tabel Lampiran 3.29 (5-6)

sub	Data waktu tempuh					Jumlah	Rata-Rata
1	6.78	6.79	7.18	7.28	7.71	35.75	7.15
2	6.84	6.32	7.34	7.29	6.60	34.39	6.88
						70.14	14.03

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{14.03}{2} = 7.01$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(6.78 - 7.01)^2 + (6.79 - 7.01)^2 + \dots + (6.60 - 7.01)^2}{10 - 1}}$$

$$\sigma = 0.41$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{0.41}{\sqrt{2}} = 0.29$$

- Nilai batas kendali atas dan batas kendali bawah:

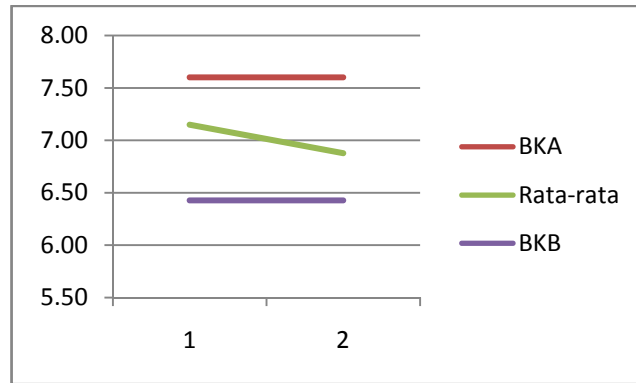
$$BKA = 7.01 + (2 \times 0.29) = 7.60$$

$$BKB = 7.01 - (2 \times 0.29) = 6.43$$



**Tabel Lampiran 3.30** Nilai Batas Kendali (5-6)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	7.60	7.15	6.43	Seragam
2	7.60	6.88	6.43	Seragam

**Gambar Lampiran 3.15** Grafik BKA dan BKB (5-6)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(6.78^2 + 6.79^2 + 7.18^2 + \dots + 6.60^2)} - (70.14)^2}{70.14} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(493.46)} - 4919.06}{70.14} \right)^2$$

$$N' = \left( \frac{40\sqrt{4939.56} - 4919.06}{70.14} \right)^2$$

$$N' = \left( \frac{40\sqrt{15.49}}{70.14} \right)^2$$

$$N' = \left( \frac{40 \times 3.94}{70.14} \right)^2$$

$$N' = \left(\frac{157.6}{70.14}\right)^2$$

$$N' = 2.24^2$$

$$N' = 5.04 \rightarrow N' \leq N, \text{ data mencukupi}$$

**Lanjutan Perhitungan Uji Keseragaman Dan Kecukupan Data  
Waktu Siklus Operator**

**1. Waktu siklus operator pada mesin Ammonia Reservoir (FA-401)**

**Tabel Lampiran 4.1** Mesin Ammonia Reservoir (FA-401)

Sub	Waktu Siklus					Jumlah	Rata-Rata
	1	33.38	32.69	34.27	32.51		
2	33.42	31.34	33.58	34.35	32.48	165.17	33.03
						330.41	66.08

**Uji Keseragaman Data**

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{66.08}{2} = 33.04$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(33.38 - 33.04)^2 + (32.69 - 33.04)^2 + \dots + (32.48 - 33.04)^2}{10 - 1}}$$

$$\sigma = 0.93$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma_{\bar{x}} = \frac{0.93}{\sqrt{2}} = 0.66$$

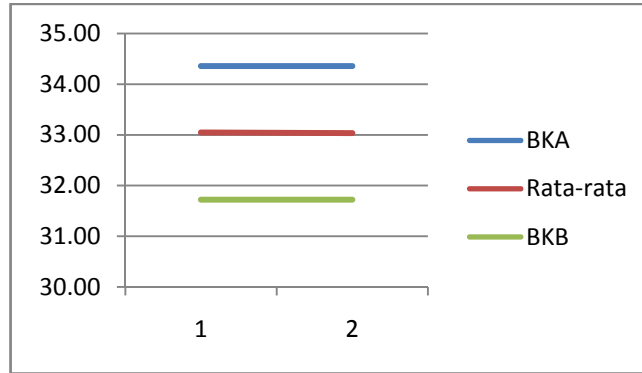
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 33.04 + (2 \times 0.66) = 34.36$$

$$BKB = 33.04 - (2 \times 0.66) = 31.72$$

**Tabel Lampiran 4.2** Nilai Batas Kendali Ammonia Reservoir (FA-401)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	34.36	33.05	31.72	Seragam
2	34.36	33.03	31.72	Seragam

**Gambar Lampiran 4.1** Grafik BKA dan BKB Ammonia Reservoir (FA-401)**Uji Kecukupan Data**

$$N' = \left( \frac{40\sqrt{10(33.38^2 + 32.69^2 + 34.27^2 + \dots + 32.48^2)} - (330.41)^2}{330.41} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(10924.89)} - 109170.77}{330.41} \right)^2$$

$$N' = \left( \frac{40\sqrt{102248.87} - 109170.77}{330.41} \right)^2$$

$$N' = \left( \frac{40\sqrt{78.10}}{330.41} \right)^2$$

$$N' = \left( \frac{40 \times 8.84}{330.41} \right)^2$$

$$N' = \left( \frac{353.6}{330.41} \right)^2$$

$$N' = 1.07^2$$

$N' = 1.14 \rightarrow N' \leq N$ , data mencukupi

## 2. Waktu siklus operator pada mesin Booster Compressor (GB-102)

**Tabel Lampiran 4.3** Mesin Booster Compressor (GB-102)

Sub	Waktu Siklus					Jumlah	Rata-Rata
	1	46.43	49.02	46.85	47.56		
2	44.63	45.75	48.63	44.05	47.48	230.90	46.18
						467.94	93.59

### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{93.59}{2} = 46.79$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(46.43 - 46.79)^2 + (49.02 - 46.79)^2 + \dots + (47.48 - 46.79)^2}{10 - 1}}$$

$$\sigma = 1.62$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{1.62}{\sqrt{2}} = 1.14$$

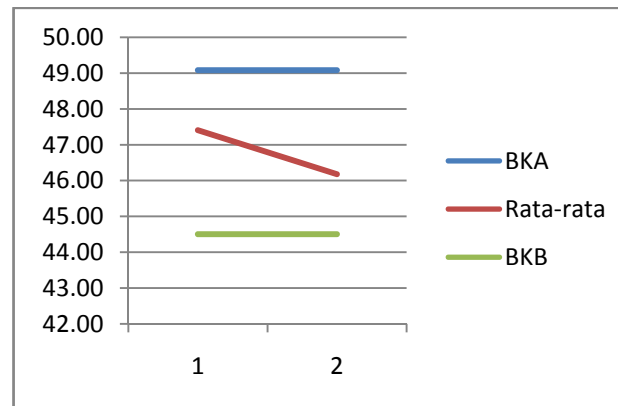
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 46.79 + (2 \times 1.14) = 49.08$$

$$BKB = 46.79 - (2 \times 1.14) = 44.50$$

**Tabel Lampiran 4.4** Nilai Batas Kendali Booster Compressor (GB-102)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	49.08	47.41	44.50	Seragam
2	49.08	46.18	44.50	Seragam



**Gambar Lampiran 4.2** Grafik BKA dan BKB Booster Compressor (GB-102)

#### Uji Kecukupan Data

$$N' = \left( \frac{40\sqrt{10(46.43^2 + 49.02^2 + 46.85^2 + \dots + 47.48^2) - (467.94)^2}}{467.94} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(21920.38) - 218967.84}}{467.94} \right)^2$$

$$N' = \left( \frac{40\sqrt{219203.78 - 218967.84}}{467.94} \right)^2$$

$$N' = \left( \frac{40\sqrt{235.94}}{467.94} \right)^2$$

$$N' = \left( \frac{40 \times 15.36}{467.94} \right)^2$$

$$N' = \left( \frac{614.4}{467.94} \right)^2$$

$$N' = 1.31^2$$

$$N' = 1.72 \rightarrow N' \leq N, \text{ data mencukupi}$$

### 3. Waktu siklus operator pada mesin Compressor (GB-101)

**Tabel Lampiran 4.5** Mesin Compressor (GB-101)

Sub	Waktu Siklus					Jumlah	Rata-Rata
1	58.02	55.47	56.57	53.48	55.38	278.92	55.78
2	55.67	53.57	57.63	55.67	53.74	276.28	55.26
						555.20	111.04

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{111.04}{2} = 55.52$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(58.02 - 55.52)^2 + (55.47 - 55.52)^2 + \dots + (53.74 - 55.52)^2}{10 - 1}}$$

$$\sigma = 9.34$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma_{\bar{x}} = \frac{9.34}{\sqrt{2}} = 6.60$$

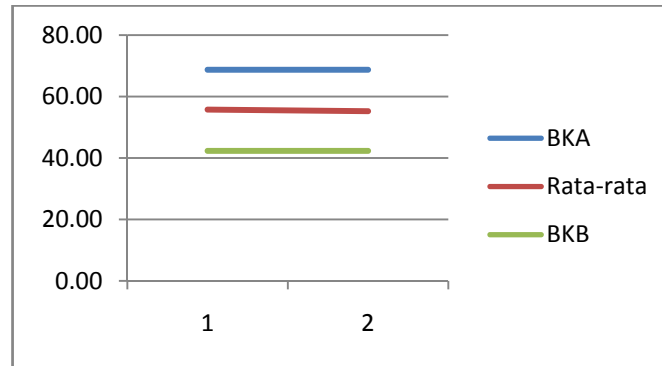
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 55.52 + (2 \times 6.60) = 68.72$$

$$BKB = 55.52 - (2 \times 6.60) = 42.32$$

**Tabel Lampiran 4.6** Nilai Batas Kendali Compressor (GB-101)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	68.72	55.78	42.32	Seragam
2	68.72	55.26	42.32	Seragam



**Gambar Lampiran 4.3** Grafik BKA dan BKB Compressor (GB-101)

#### Uji Kecukupan Data

$$N' = \left( \frac{40 \sqrt{10(58.02^2 + 55.47^2 + 56.57^2 + \dots + 53.74^2) - (555.20)^2}}{555.20} \right)^2$$



$$N' = \left( \frac{40\sqrt{10(30847.71) - 308247.04}}{555.20} \right)^2$$

$$N' = \left( \frac{40\sqrt{308477.08 - 308247.04}}{555.20} \right)^2$$

$$N' = \left( \frac{40\sqrt{230.04}}{555.20} \right)^2$$

$$N' = \left( \frac{40 \times 15.17}{555.20} \right)^2$$

$$N' = \left( \frac{606.8}{555.20} \right)^2$$

$$N' = 1.09^2$$

$$N' = 1.19 \rightarrow N' \leq N, \text{ data mencukupi}$$

#### 4. Waktu siklus operator pada mesin Ammonia Preheater (EA-101)

**Tabel Lampiran 4.7** Mesin Ammonia Preheater (EA-101)

Sub	Waktu Siklus					Jumlah	Rata-
							Rata
1	52.27	54.01	49.47	52.25	50.01	258.01	51.60
2	54.69	53.27	54.01	52.11	50.83	264.91	52.98
						522.92	104.58

#### Uji Keseragaman Data

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{104.58}{2} = 52.29$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(52.27 - 52.29)^2 + (54.01 - 52.29)^2 + \dots + (50.83 - 52.29)^2}{10 - 1}}$$

$$\sigma = 1.76$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma_{\bar{x}} = \frac{1.76}{\sqrt{2}} = 1.25$$

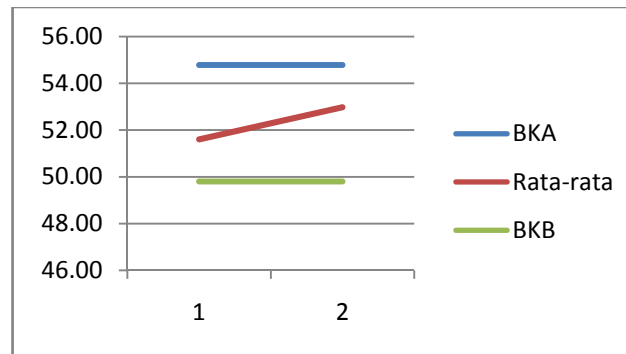
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 52.29 + (2 \times 1.25) = 54.78$$

$$BKB = 52.29 - (2 \times 1.25) = 49.80$$

**Tabel Lampiran 4.8** Nilai Batas Ammonia Preheater (EA-101)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	54.78	51.60	49.80	Seragam
2	54.78	52.98	49.80	Seragam



**Gambar Lampiran 4.4** Grafik BKA dan BKB Ammonia Preheater (EA-101)

### Uji Kecukupan Data

$$N' = \left( \frac{40\sqrt{10(52.27^2 + 54.01^2 + 49.47^2 + \dots + 50.83^2)} - (522.92)^2}{522.92} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(27372.49)} - 273445.33}{522.92} \right)^2$$

$$N' = \left( \frac{40\sqrt{273724.87} - 273445.33}{522.92} \right)^2$$

$$N' = \left( \frac{40\sqrt{279.54}}{522.92} \right)^2$$

$$N' = \left( \frac{40 \times 16.72}{522.92} \right)^2$$

$$N' = \left( \frac{668.8}{522.92} \right)^2$$

$$N' = 1.27^2$$

$N' = 1.64 \rightarrow N' \leq N$ , data mencukupi

#### 5. Waktu siklus operator pada mesin Urea Syhthetic Reactor (DC-101)

**Tabel Lampiran 4.9** Mesin Urea Syhthetic Reactor (DC-101)

Sub	Waktu Siklus					Jumlah	Rata-Rata
1	57.54	59.43	61.43	60.83	63.75	302.89	60.60
2	59.08	60.14	60.63	62.36	61.45	303.66	60.73
						606.64	121.33

**Uji Keseragaman Data**

- Nilai rata-rata dari harga rata-rata sub grup:

$$\bar{x} = \frac{121.33}{2} = 60.66$$

- Nilai standart deviasi sebenarnya dari waktu penyelesaian:

$$\sigma = \sqrt{\frac{(57.54 - 60.66)^2 + (59.43 - 60.66)^2 + \dots + (61.45 - 60.66)^2}{10 - 1}}$$

$$\sigma = 9$$

- Nilai standart deviasi dari distribusi harga rata-rata sub grup:

$$\sigma \bar{x} = \frac{9}{\sqrt{2}} = 6.36$$

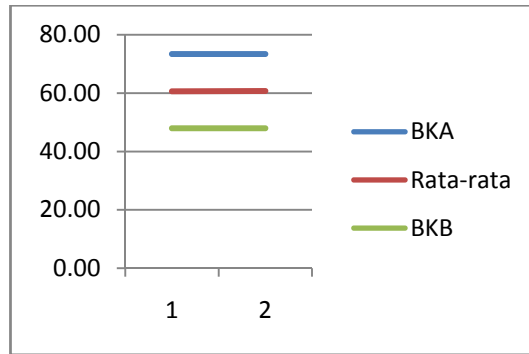
- Nilai batas kendali atas dan batas kendali bawah:

$$BKA = 60.66 + (2 \times 6.36) = 73.39$$

$$BKB = 60.66 - (2 \times 6.36) = 47.94$$

**Tabel Lampiran 4.10** Nilai Batas Urea Sythetic Reactor (DC-101)

Sub Grup	BKA	Rata-rata	BKB	Keterangan
1	73.39	60.60	47.94	Seragam
2	73.39	60.73	47.94	Seragam



**Gambar Lampiran 4.5** Grafik BKA dan BKB Urea Syhthetic Reactor

### Uji Kecukupan Data

$$N' = \left( \frac{40\sqrt{10(57.54^2 + 59.43^2 + 61.43^2 + \dots + 61.45^2)} - (606.64)^2}{606.64} \right)^2$$

$$N' = \left( \frac{40\sqrt{10(36828.91)} - 368012.09}{606.64} \right)^2$$

$$N' = \left( \frac{40\sqrt{368289.08} - 368012.09}{606.64} \right)^2$$

$$N' = \left( \frac{40\sqrt{276.99}}{606.64} \right)^2$$

$$N' = \left( \frac{40 \times 16.64}{606.64} \right)^2$$

$$N' = \left( \frac{665.6}{606.64} \right)^2$$

$$N' = 1.09^2$$

$$N' = 1.20 \rightarrow N' \leq N, \text{ data mencukupi}$$