

UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Kedua
Sidang 1986/87

MKT362 - Statistik Gunaan I

Tarikh: 8 April 1987

Masa: 9.00 pagi - 12.00 tengahari

(3 jam)

Jawab mana-mana LIMA soalan; semua soalan mesti dijawab dalam Bahasa Malaysia.

1. (a) (i) Apakah tujuh alat utama kawalan kualiti itu?
Apakah fungsi-fungsinya?
- (ii) Huraikan secara ringkas bagaimana setiap yang berikut digunakan di dalam bidang kawalan kualiti:
- (1) histogram
 - (2) gambarajah sebaran
 - (3) gambarajah pareto.

(50/100)

- (b) Sebuah kilang mempunyai 5 buah mesin untuk menghasilkan butir elektrik. Sampel sebanyak 300 cerapan diambil dari setiap mesin dan bilangan butir yang tidak memenuhi speksifikasi adalah seperti berikut:

| Mesin | | | | |
|-------|----|-----|----|----|
| I | II | III | IV | V |
| 5 | 15 | 12 | 7 | 20 |

Adakah kualiti butir elektrik yang dihasilkan 5 buah mesin itu sama? Gunakan $\alpha = 0.05$.

(50/100)

.../2

2. (a) (i) Terangkan setiap yang berikut:

- (1) sebab-sebab peluang
- (2) sebab-sebab terumpukkan
- (3) prinsip yang digunakan di dalam pembinaan carta kawalan.

(ii) Jika suatu proses di luar kawalan, terangkan corak-corak yang mungkin dan berikan sebab-sebab terumpukkan utama yang mungkin.

(50/100)

(b) (i) Tentukan garis tengah dan had-had kawalan percubaan bagi carta- \bar{X} -R bagi data yang berikut: (setiap subsampel bersaiz 5).

| Nombor subsampel | \bar{X} | R | Nombor subsampel | \bar{X} | R |
|------------------|-----------|----|------------------|-----------|----|
| 1 | 175.6 | 23 | 11 | 179.8 | 9 |
| 2 | 176.6 | 8 | 12 | 176.4 | 8 |
| 3 | 178.4 | 22 | 13 | 178.4 | 7 |
| 4 | 177.0 | 12 | 14 | 178.2 | 4 |
| 5 | 179.4 | 7 | 15 | 180.6 | 6 |
| 6 | 178.6 | 8 | 16 | 179.6 | 10 |
| 7 | 179.6 | 15 | 17 | 177.8 | 9 |
| 8 | 178.8 | 6 | 18 | 178.4 | 7 |
| 9 | 184.2 | 7 | 19 | 181.6 | 6 |
| 10 | 176.6 | 24 | 20 | 177.6 | 25 |

(ii) Plotkan data di dalam carta percubaan.

(iii) Jika terdapat titik di luar kawalan, anggapkan sebabnya terumpukkan dan tentukan garis tengah dan had-had kawalan akhirnya untuk kegunaan kelak.

(50/100)

3. (a) Indeks keupayaan bagi suatu proses penghasilan ialah

$$C_p = \frac{U - L}{6\sigma}$$

- U = speksifikasi atas
- L = speksifikasi bawah
- σ = sisihan piawai proses.

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Terangkan kedudukan $C_p > 1$, $C_p = 1$ dan $C_p < 1$.

Apakah nilai C_p yang biasa digunakan?

(20/100)

- (b) Anggapkan sistem berpemberat demerit 9:3:1 digunakan, tentukan carta-demerit per unit jika $u_{oc} = 0.11$, $u_{oma} = 0.60$, $u_{omi} = 4.00$ dan $n = 50$. Jika hasil inspeksi subsampel suatu hari ialah 1 cacatan genting, 35 major dan 110 minor, tentukan bilangan demerit per unit bagi subsampel ini dan tentukan samada ia di dalam kawalan atau di luar kawalan.

(30/100)

- (c) (i) Tentukan garis tengah dan had-had kawalan percubaan bagi carta-p untuk data yang berikut: (setiap subsampel bersaiz 3000).

| Nombor subsampel | Bilangan butir yang cacat | Nombor subsampel | Bilangan butir yang cacat |
|------------------|---------------------------|------------------|---------------------------|
| 1 | 123 | 13 | 98 |
| 2 | 35 | 14 | 34 |
| 3 | 92 | 15 | 10 |
| 4 | 45 | 16 | 53 |
| 5 | 10 | 17 | 72 |
| 6 | 67 | 18 | 87 |
| 7 | 65 | 19 | 165 |
| 8 | 12 | 20 | 24 |
| 9 | 85 | 21 | 50 |
| 10 | 115 | 22 | 69 |
| 11 | 24 | 23 | 8 |
| 12 | 106 | 24 | 35 |

- (ii) Plotkan data di dalam carta percubaan.
- (iii) Jika terdapat titik-titik di luar kawalan, anggapkan sebabnya terumpukkan dan memperbaiki carta kawalan ini untuk kegunaan kelak.
- (iv) Pada suatu hari, sampel sebanyak 1500 diperiksa dan didapati 47 daripadanya cacat. Adakah proses penghasilan di dalam kawalan?

(50/100)

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4. (a) Terangkan setiap yang berikut:

- (i) Risiko pengeluar; risiko pengguna.
- (ii) Rancangan pensampelan penerimaan tunggal; rancangan pensampelan penerimaan berganda.

(20/100)

(b) Binakan lengkung cirian operasi untuk rancangan pensampelan penerimaan tunggal, $N = 9000$, $n = 100$ dan $C = 3$. Lakarkan juga lengkung AOQ. Apakah AOQL-nya?

(40/100)

(c) Tentukan persamaan untuk lengkung cirian operasi bagi rancangan pensampelan penerimaan yang berikut dan lakarkan grafnya dengan menggunakan lebih kurang 6 titik.

$$N = 10,000, n_1 = 200, c_1 = 1, r_1 = 4$$
$$n_2 = 100, c_2 = 4, r_2 = 6.$$

(40/100)

5. (a) Terangkan sifat-sifat lengkung cirian operasi mengenai saiz lot, saiz sampel dan nombor penerimaan.

(20/100)

(b) Untuk saiz lot $N = 2500$, $AQL = 0.40\%$ dan paras inspeksi II, tentukan rancangan pensampelan penerimaan tunggal untuk inspeksi normal, ketat dan longgar. Terangkan makna nombor-nombor itu.

(40/100)

(c) Untuk saiz lot $N = 25000$, $AQL = 1.0\%$ dan paras inspeksi II, tentukan rancangan pensampelan penerimaan berganda dua untuk inspeksi normal, ketat dan longgar. Terangkan makna nombor-nombor itu.

(40/100)

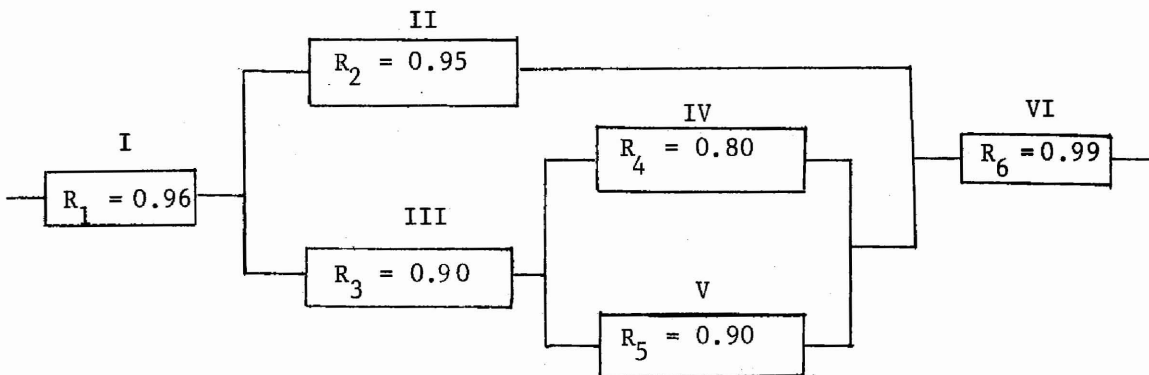
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6. (a) Terangkan setiap yang berikut:

- (i) kebolehpercayaan
- (ii) kadar kegagalan suatu taburan.

(20/100)

(b) Cari kebolehpercayaan sistem 6 komponen berikut:



kebolehpercayaan setiap komponen dinyatakan di dalam setiap komponen itu.

(30/100)

(c) Katakan kadaran kegagalan untuk suatu pembolehubah rawak X ialah

$$h(x) = \frac{\beta}{\eta} \left(\frac{x - \gamma}{\eta} \right)^{\beta-1}, \quad x \geq \gamma$$

β, η, γ ialah pemalar dengan $\beta, \eta > 0$, dan $\gamma \geq 0$.

Dapatkan fungsi ketumpatan kebarangkalian bagi X. Apakah kebarangkalian bahawa alat yang memenuhi taburan ini akan gagal sebelum masa $x = 1$ jika $\beta = 2.5, \eta = 1$, dan $\gamma = 0$?

(50/100)

TABLE B Factors for Computing Central Lines and 3 σ Control Limits for \bar{X} , s , and R , Charts

| Observations in Sample, n | Chart for Averages | | | Chart for Standard Deviations | | | | | | Chart for Ranges | | | | | | |
|-----------------------------------|-------------------------------|-------|-------|-------------------------------|---------|----------------------------|-------|-------|-------|-----------------------------|---------|----------------------------|-------|-------|-------|-------|
| | Factors for Control Limits | | | Factors for Central Line | | Factors for Control Limits | | | | Factors for Central Line | | Factors for Control Limits | | | | |
| | A | A_2 | A_3 | c_4 | $1/c_4$ | B_3 | B_4 | B_5 | B_6 | d_2 | $1/d_2$ | d_1 | D_1 | D_2 | D_3 | D_4 |
| 2 | 2.121 | 1.880 | 2.659 | 0.7979 | 1.2533 | 0 | 3.267 | 0 | 2.606 | 1.128 | 0.8865 | 0.853 | 0 | 3.686 | 0 | 3.267 |
| 3 | 1.732 | 1.023 | 1.954 | 0.8862 | 1.1284 | 0 | 2.568 | 0 | 2.276 | 1.693 | 0.5907 | 0.888 | 0 | 4.358 | 0 | 2.574 |
| 4 | 1.500 | 0.729 | 1.628 | 0.9213 | 1.0854 | 0 | 2.266 | 0 | 2.088 | 2.059 | 0.4857 | 0.880 | 0 | 4.698 | 0 | 2.282 |
| 5 | 1.342 | 0.577 | 1.427 | 0.9400 | 1.0638 | 0 | 2.089 | 0 | 1.964 | 2.326 | 0.4299 | 0.864 | 0 | 4.918 | 0 | 2.114 |
| 6 | 1.225 | 0.483 | 1.287 | 0.9515 | 1.0510 | 0.030 | 1.970 | 0.029 | 1.874 | 2.534 | 0.3946 | 0.848 | 0 | 5.078 | 0 | 2.004 |
| 7 | 1.134 | 0.419 | 1.182 | 0.9594 | 1.0423 | 0.118 | 1.882 | 0.113 | 1.806 | 2.704 | 0.3698 | 0.833 | 0.204 | 5.204 | 0.076 | 1.924 |
| 8 | 1.061 | 0.373 | 1.099 | 0.9650 | 1.0363 | 0.185 | 1.815 | 0.179 | 1.751 | 2.847 | 0.3512 | 0.820 | 0.388 | 5.306 | 0.136 | 1.864 |
| 9 | 1.000 | 0.337 | 1.032 | 0.9693 | 1.0317 | 0.239 | 1.761 | 0.232 | 1.707 | 2.970 | 0.3367 | 0.808 | 0.547 | 5.393 | 0.184 | 1.816 |
| 10 | 0.949 | 0.308 | 0.975 | 0.9727 | 1.0281 | 0.284 | 1.716 | 0.276 | 1.669 | 3.078 | 0.3249 | 0.797 | 0.687 | 5.469 | 0.223 | 1.777 |
| 11 | 0.905 | 0.285 | 0.927 | 0.9754 | 1.0252 | 0.321 | 1.679 | 0.313 | 1.637 | 3.173 | 0.3152 | 0.787 | 0.811 | 5.535 | 0.256 | 1.744 |
| 12 | 0.866 | 0.266 | 0.886 | 0.9776 | 1.0229 | 0.354 | 1.646 | 0.346 | 1.610 | 3.258 | 0.3069 | 0.778 | 0.922 | 5.594 | 0.283 | 1.717 |
| 13 | 0.832 | 0.249 | 0.850 | 0.9794 | 1.0210 | 0.382 | 1.618 | 0.374 | 1.585 | 3.336 | 0.2998 | 0.770 | 1.025 | 5.647 | 0.307 | 1.693 |
| 14 | 0.802 | 0.235 | 0.817 | 0.9810 | 1.0194 | 0.406 | 1.594 | 0.399 | 1.563 | 3.407 | 0.2935 | 0.763 | 1.118 | 5.696 | 0.328 | 1.672 |
| 15 | 0.775 | 0.223 | 0.789 | 0.9823 | 1.0180 | 0.428 | 1.572 | 0.421 | 1.544 | 3.472 | 0.2880 | 0.756 | 1.203 | 5.741 | 0.347 | 1.653 |
| 16 | 0.750 | 0.212 | 0.763 | 0.9835 | 1.0168 | 0.448 | 1.552 | 0.440 | 1.526 | 3.532 | 0.2831 | 0.750 | 1.282 | 5.782 | 0.363 | 1.637 |
| 17 | 0.728 | 0.203 | 0.739 | 0.9845 | 1.0157 | 0.466 | 1.534 | 0.458 | 1.511 | 3.588 | 0.2787 | 0.744 | 1.356 | 5.820 | 0.378 | 1.622 |
| 18 | 0.707 | 0.194 | 0.718 | 0.9854 | 1.0148 | 0.482 | 1.518 | 0.475 | 1.496 | 3.640 | 0.2747 | 0.739 | 1.424 | 5.856 | 0.391 | 1.608 |
| 19 | 0.688 | 0.187 | 0.698 | 0.9862 | 1.0140 | 0.497 | 1.503 | 0.490 | 1.483 | 3.689 | 0.2711 | 0.734 | 1.487 | 5.891 | 0.403 | 1.597 |
| 20 | 0.671 | 0.180 | 0.680 | 0.9869 | 1.0133 | 0.510 | 1.490 | 0.504 | 1.470 | 3.735 | 0.2677 | 0.729 | 1.549 | 5.921 | 0.415 | 1.585 |
| 21 | 0.655 | 0.173 | 0.663 | 0.9876 | 1.0126 | 0.523 | 1.477 | 0.516 | 1.459 | 3.778 | 0.2647 | 0.724 | 1.605 | 5.951 | 0.425 | 1.575 |
| 22 | 0.640 | 0.167 | 0.647 | 0.9882 | 1.0119 | 0.534 | 1.466 | 0.528 | 1.448 | 3.819 | 0.2618 | 0.720 | 1.659 | 5.979 | 0.434 | 1.566 |
| 23 | 0.626 | 0.162 | 0.633 | 0.9887 | 1.0114 | 0.545 | 1.455 | 0.539 | 1.438 | 3.858 | 0.2592 | 0.716 | 1.710 | 6.006 | 0.443 | 1.557 |
| 24 | 0.612 | 0.157 | 0.619 | 0.9892 | 1.0109 | 0.555 | 1.445 | 0.549 | 1.429 | 3.895 | 0.2567 | 0.712 | 1.759 | 6.031 | 0.451 | 1.548 |
| 25 | 0.600 | 0.153 | 0.606 | 0.9896 | 1.0105 | 0.565 | 1.435 | 0.559 | 1.420 | 3.931 | 0.2544 | 0.708 | 1.806 | 6.056 | 0.459 | 1.541 |

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Table 6-5 Sample-Size Code Letters (Table I of MIL-STD 105D)

| Lot or batch size | | | Special inspection levels | | | | General inspection levels | | |
|-------------------|-----|--------|---------------------------|-----|-----|-----|---------------------------|----|-----|
| | | | S-1 | S-2 | S-3 | S-4 | I | II | III |
| 2 | to | 8 | A | A | A | A | A | A | B |
| 9 | to | 15 | A | A | A | A | A | B | C |
| 16 | to | 25 | A | A | B | B | B | C | D |
| 26 | to | 50 | A | B | B | C | C | D | E |
| 51 | to | 90 | B | B | C | C | C | E | F |
| 91 | to | 150 | B | B | C | D | D | F | G |
| 151 | to | 280 | B | C | D | E | E | G | H |
| 281 | to | 500 | B | C | D | E | F | H | J |
| 501 | to | 1200 | C | C | E | F | G | J | K |
| 1201 | to | 3200 | C | D | E | G | H | K | L |
| 3201 | to | 10000 | C | D | F | G | J | L | M |
| 10001 | to | 35000 | C | D | F | H | K | M | N |
| 35001 | to | 150000 | D | E | G | J | L | N | P |
| 150001 | to | 500000 | D | E | G | J | M | P | Q |
| 500001 | and | over | D | E | H | K | N | Q | R |

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Note.

Small sample inspection levels of MIL-STD-106C

L-1 and L-2.....
 L-3 and L-4.....
 L-5 and L-6.....
 L-7 and L-8.....

Convert to these special inspection levels

S-1
 S-2
 S-3
 S-4

Table 6-6 Single Sampling Plans for Normal Inspection (Table II-A of MIL-STD 105D)*

| Sample size code letter | Sample size | Acceptable Quality Levels (normal inspection) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|-------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | | 0.010 | 0.015 | 0.025 | 0.040 | 0.065 | 0.10 | 0.15 | 0.25 | 0.40 | 0.65 | 1.0 | 1.5 | 2.5 | 4.0 | 6.5 | 10 | 15 | 25 | 40 | 65 | 100 | 150 | 250 | 400 | 650 | 1000 | | |
| | | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | |
| A | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| B | 3 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| C | 5 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| D | 8 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| E | 13 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| F | 20 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| G | 32 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| H | 50 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| J | 80 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| K | 125 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| L | 200 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| M | 315 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| N | 500 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| P | 800 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| Q | 1250 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| R | 2000 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | | |

↓ = Use first sampling plan below arrow. If sample size equals, or exceeds, lot or batch size, do 100 percent inspection.
 ↑ = Use first sampling plan above arrow.

Ac = Acceptance number.
 Re = Rejection number.

Table 6-7 Single Sampling Plans for Tightened Inspection (Table II-B of MIL-STD 105D)*

| Sample size code letter | Sample size | Acceptable Quality Levels (tightened inspection) | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|-------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | | 0.010 | 0.015 | 0.025 | 0.040 | 0.065 | 0.10 | 0.15 | 0.25 | 0.40 | 0.65 | 1.0 | 1.5 | 2.5 | 4.0 | 6.5 | 10 | 15 | 25 | 40 | 65 | 100 | 150 | 250 | 400 | 650 | 1000 | | |
| | | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | |
| A | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| B | 3 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| C | 5 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| D | 8 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| E | 13 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| F | 20 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| G | 32 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| H | 50 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| J | 80 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| K | 125 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| L | 200 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| M | 315 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| N | 500 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| P | 800 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| Q | 1250 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |
| R | 2000 | 0 1 | ↑ | ↓ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | | |
| S | 3150 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | | |

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- ↓ = Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100 percent inspection.
- ↑ = Use first sampling plan above arrow.
- Ac = Acceptance number.
- Re = Rejection number.

Table 6-8 Single Sampling Plans for Reduced Inspection (Table II-C of MIL-STD 105D)*

| Sample size code letter | Sample size | Acceptable Quality Levels (reduced inspection)† | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|-------------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | | 0.010 | 0.015 | 0.025 | 0.040 | 0.065 | 0.10 | 0.15 | 0.25 | 0.40 | 0.65 | 1.0 | 1.5 | 2.5 | 4.0 | 6.5 | 10 | 15 | 25 | 40 | 65 | 100 | 150 | 250 | 400 | 650 | 1000 | | |
| | | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | Ac Re | |
| A | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↓ | ↓ | 1 2 | 2 3 | 3 4 | 5 6 | 7 8 | 10 11 | 14 15 | 21 22 | 30 31 | | |
| B | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 2 4 | 3 5 | 5 6 | 7 8 | 10 11 | 14 15 | 21 22 | 30 31 | |
| C | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | 14 17 | 21 24 | |
| D | 3 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | 14 17 | 21 24 | ↑ | ↑ | | |
| E | 5 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| F | 8 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| G | 13 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| H | 20 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| J | 32 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| K | 50 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| L | 80 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| M | 125 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| N | 200 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| P | 315 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| Q | 500 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |
| R | 800 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | ↑ | ↓ | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | | |

- ↓ = Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100 percent inspection.
- ↑ = Use first sampling plan above arrow.
- Ac = Acceptance number.
- Re = Rejection number.
- † = If the acceptance number has been exceeded, but the rejection number has not been reached, accept the lot, but reinstate normal inspection (see 10.1.4).

Table 6-10 Double Sampling Plans for Tightened Inspection (Table III-B of MIL-STD 105D)^a

| Sample size code letter | Sample | Sample size | Cumulative sample size | Acceptable Quality Levels (tightened inspection) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|-----------------|--------------|------------------------|--|----|-------|----|-------|----|-------|----|-------|----|------|----|------|----|------|----|------|----|------|----|-----|----|-----|----|-----|----|-----|----|-----|----|----|----|----|----|----|----|----|----|----|----|-----|----|-----|----|-----|----|-----|----|-----|----|------|--|
| | | | | 0.010 | | 0.015 | | 0.025 | | 0.040 | | 0.065 | | 0.10 | | 0.15 | | 0.25 | | 0.40 | | 0.65 | | 1.0 | | 1.5 | | 2.5 | | 4.0 | | 6.5 | | 10 | | 15 | | 25 | | 40 | | 65 | | 100 | | 150 | | 250 | | 400 | | 650 | | 1000 | |
| | | | | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | Ac | Re | | |
| A | | | | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | First Second | 2 2 | 2 4 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | First Second | 3 3 | 3 6 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | First Second | 5 5 | 5 10 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | First Second | 8 8 | 8 16 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | First Second | 13 13 | 13 26 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G | First Second | 20 20 | 20 40 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H | First Second | 32 32 | 32 64 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| J | First Second | 50 50 | 50 100 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| K | First Second | 80 80 | 80 160 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L | First Second | 125 125 | 125 250 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| M | First Second | 200 200 | 200 400 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N | First Second | 315 315 | 315 630 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P | First Second | 500 500 | 500 1000 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q | First Second | 800 800 | 800 1600 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R | First Second | 1250 1250 | 1250 2500 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S | First Second | 2000 2000 | 2000 4000 | ↓ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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 - Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100 percent inspection.
  - Use first sampling plan above arrow.

 Ac - Acceptance number.

 Re - Rejection number.

 e - Use corresponding single sampling plan (or alternatively, use double sampling plan below, where available).

