

UNIVERSITI SAINS MALAYSIA

Peperiksaan Semester Kedua
Sidang 1987/88

MKT362 - Statistik Gunaan I

Tarikh: 7 April 1988

Masa: 2.15 petang - 5.15 petang
(3 jam)

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

Sifir-sifir dilampirkan (8 lampiran).

1. (a) (i) Apakah tujuh alat utama kawalan kualiti itu?
- (ii) Huraikan secara ringkas setiap yang berikut tentang kegunaannya di dalam bidang kawalan kualiti.
- (1) Gambarajah sebaran dan korelasi.
 - (2) Gambarajah Pareto.
 - (3) Gambarajah sebab-dan-kesan.

(40/100)

- (b) Carta kawalan digunakan untuk suatu ukuran untuk butir-butir di dalam suatu proses penghasilan. Sampel hari ini di dalam susunan masa adalah seperti berikut:

67.3 68.2 71.6 69.3 71.6 70.4 65.0 63.6 64.7 69.4
68.4 65.3 64.2 67.6 68.6 66.8 68.9 66.8 70.1 69.8

Kelaskan ukuran-ukuran ini sama ada nilainya atas median sampel atau bawah median sampel dan gunakan ujian larian untuk menentukan sama ada proses penghasilan ini stabil atau tidak sebelum data ini dimasukkan ke dalam carta kawalan. Diketahui, jika data itu diambil secara rawak, nilai jangkakan bilangan larian ialah $(n+2)/2$ dan variansnya ialah $\frac{n(n-2)}{4(n-1)}$ dan taburannya normal secara asimptot.

(40/100)

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- (c) Terangkan prinsip yang digunakan di dalam pembinaan suatu carta kawalan. Gunakan carta-C di dalam penerangan anda.

(20/100)

2. (a) Data awal yang berikut diperolehi untuk membina carta kawalan $\bar{x} - R$ bagi suatu ciri ukuran daripada sesuatu proses penghasilan.

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

- (i) Dapatkan garis tengah dan had-had kawalan percubaan dan plotkan data itu di dalam carta kawalan percubaan.
- (ii) Jika terdapat titik di luar had-had kawalan, anggapkan sebabnya terumpukkan, periksa semula garis tengah dan had-had kawalan untuk kegunaan kelak.

Apakah yang boleh dinyatakan tentang data awal ini berkenaan kawalan proses penghasilannya?

(40/100)

- (b) Anggapkan sistem berpemberat 10 : 4 : 2 digunakan.

- (i) Tentukan carta-demerit per unit jika

$$u_{oc} = 0.10, u_{oma} = 0.50 \text{ dan } u_{omi} = 4.00 .$$

- (ii) Pada suatu hari, pemeriksaan 50 butir memberikan:

bilangan kecacatan genting = 3
 bilangan kecacatan major = 30
 bilangan kecacatan nombor = 180

Dapatkan bilangan demerit per unit untuk sampel ini. Sampel ini di dalam kawalan atau di luar kawalan?

(30/100)

.../3

- (c) μ ialah min suatu populasi normal yang variannya $\sigma^2 = 1$.
 Di dalam kaedah ujian berjujukan tentang

$$H_0 : \mu = 0$$

$$H_A : \mu = 1, \quad \alpha = 0.01, \quad \beta = 0.10$$

tunjukkan rantau penerimaan H_0 , rantau penolakan H_0 dan rantau berterusan pensampelan di dalam satah-my. m ialah bilangan cerapan yang digunakan dan

$$y = \sum_{i=1}^m x_i, \quad x_1, x_2, \dots, x_m, \dots \text{ ialah cerapan.}$$

(30/100)

3. (a) Sebuah kilang mengeluarkan banyak jenis tuib radio dengan bilangan yang besar. Kebelakangan ini, tuib jenis A-nya memberikan banyak masalah. Yang berikut ialah maklumat daripada 21 sampel (saiz setiap sampel ialah 100):

Nombor sampel	Bilangan butir yang cacat	Nombor sampel	Bilangan butir yang cacat
1	12	12	36
2	23	13	21
3	14	14	14
4	10	15	12
5	8	16	12
6	14	17	19
7	14	18	21
8	19	19	16
9	8	20	24
10	17	21	11
11	21		

- (i) Tentukan garis-tengah dan had-had kawalan untuk carta-p untuk data awal ini.
- (ii) Jika terdapat titik-titik di dalam had-had kawalan, anggapkan sebabnya terumpukkan. Periksa semula garis-tengah dan had-had kawalan.

(40/100)

.../4

- (b) Untuk meningkatkan lagi mutu kain yang dikeluarkannya, sebuah kilang tekstil ingin menggunakan carta-C untuk mengawal bilangan kecacatan di dalam setiap gulung kain. Data awal 25 cerapan adalah seperti yang berikut:

Nombor gulung	Bilangan kecacatan	Nombor gulung	Bilangan kecacatan
1	14	14	22
2	5	15	1
3	10	16	6
4	19	17	14
5	0	18	8
6	6	19	6
7	2	20	9
8	9	21	7
9	8	22	1
10	7	23	5
11	3	24	12
12	12	25	4
13	1		

- (i) Tentukan garis-tengah dan had-had kawalan percubaan.
- (ii) Jika terdapat titik-titik yang diluar had-had kawalan, anggapkan sebabnya terumpukkan. Periksa semula garis-tengah dan had-had kawalan untuk kegunaan kelak.

(30/100)

- (c) Huraikan tentang setiap yang berikut:

- (i) Perhubungan di antara had-had kawalan, spesifikasi-spesifikasi dan indeks keupayaan.
- (ii) Carta kawalan \bar{x} - R digunakan untuk ukuran suatu proses penghasilan. Jika proses itu di luar kawalan, terangkan corak-corak yang mungkin dan sebab-sebab terumpukkan utama yang mungkin.

(30/100)

4. (a) Huraikan

- (i) kedudukan yang sesuai untuk mengadakan rancangan pensampelan penerimaan.
- (ii) kebaikan dan keburukan sesuatu rancangan pensampelan penerimaan.

(20/100)

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(b) Yang berikut ialah rancangan pensampelan berganda tiga.

$$N = 3000$$

$$n_1 = 30, \quad c_1 = 0, \quad r_1 = 3$$

$$n_2 = 30, \quad c_2 = 3, \quad r_2 = 6$$

$$n_3 = 30, \quad c_3 = 5, \quad r_3 = 6$$

Katakan x_1, x_2, x_3 masing-masing menandakan bilangan butir yang cacat di dalam sampel yang pertama, kedua dan ketiga.

- (i) Dapatkan lengkung-lengkung cirian pengoperasian selepas sampel yang pertama dan yang kedua.
- (ii) Dapatkan persamaan untuk lengkung cirian pengoperasian pada sampel yang ketiga.

(60/100)

(c) Rancangan pensampel penerimaan dengan sifat yang serupa mungkin memberikan lengkung cirian pengoperasian yang berlainan. Huraikan.

(20/100)

5. (a) Terangkan setiap yang berikut:

- (1) Risiko pengeluaran, risiko pengguna.
- (2) AOQ (kualiti keluar secara purata).
- (3) LQL (paras kualiti penghad).
- (4) AOQL (had kualiti keluar secara purata).
- (5) AQL (paras kualiti boleh diterima).

(40/100)

(b) Untuk saiz lot $N = 3,000$, $AQL = 0.40\%$, gunakan MIL -STD-105D pada paras inspeksi II, tentukan rancangan pensampelan penerimaan tunggal untuk inspeksi normal, ketat dan longgar. Terangkan makna nombor-nombor itu.

(30/100)

(c) Untuk saiz lot $N = 30,000$, $AQL = 1.0\%$, gunakan MIL -STD -105D pada paras inspeksi II, tentukan rancangan pensampelan penerimaan berganda dua untuk inspeksi normal, ketat dan longgar. Terangkan makna nombor-nombor itu.

(30/100)

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6. (a) Huraikan

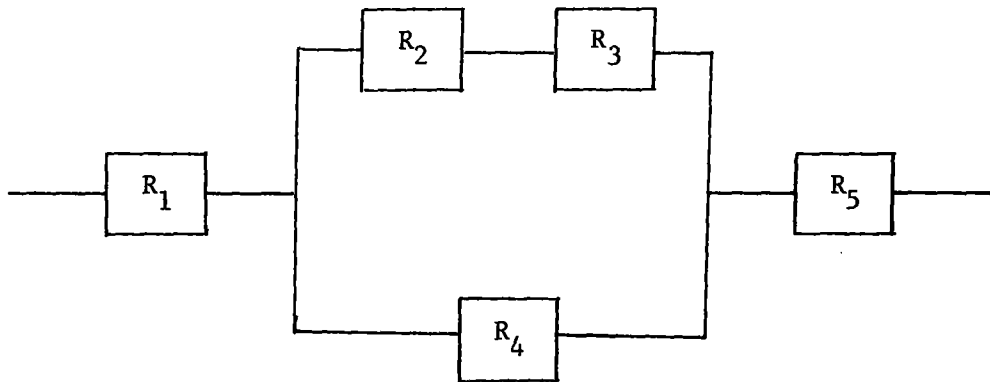
- (i) kebolehpercayaan sesuatu butir, kebolehpercayaan sistem.
- (ii) faktor-faktor yang berkaitan dengan kebolehpercayaan.
- (iii) kadar bahaya sesuatu taburan.

(30/100)

(b) Setiap komponen sistem yang ditunjukkan di bawah mempunyai masahayat yang taburannya mengikut f.k.k. yang berikut:

$$f(x) = \frac{1}{500} e^{-x/500}, \quad x > 0$$

(x di dalam masa jam),



Cari kebolehpercayaan sistem ini pada masa 1000 jam.

(30/100)

(c) Jika kadar bahaya untuk sesuatu ukuran X ialah

$$h(x) = e^x, \quad -\infty < x < \infty,$$

dapatkan fungsi ketumpatan kebarangkalian bagi X.
Apakah kebarangkalian bahawa $X > e$?

(40/100)

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	0.836	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	0.155	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

General to above
Special
inspection levels
B-1
B-2
B-3
B-4

Small sample inspection levels of MIL-STD-105C
L-1 and L-2
L-3 and L-4
L-5 and L-6
L-7 and L-8

Note.

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
A	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↓	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31
B	3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45
C	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45	↑
D	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45	↑	↑	
E	13	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	30 31	44 45	↑	↑	
F	20	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	
G	32	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	
H	50	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	
J	80	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	
K	125	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
L	200	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
M	315	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
N	500	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
P	800	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
Q	1250	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
R	2000	↑	↑	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	

↓ = 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	1.0	1.5	2.5	4.0	6.5	10	15	25	40	65	100	150	250	400	650	1000	
A	2	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
B	3	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
C	5	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
D	8	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
E	13	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
F	20	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
G	32	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
H	50	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
I	80	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
J	125	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
K	200	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
L	315	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
M	500	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
N	800	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
P	1250	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
Q	2000	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
R	3150	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→

→ 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	Acceptable Quality Levels (reduced inspection)†																					
	0.010	0.015	0.025	0.040	0.065	1.0	1.5	2.5	4.0	6.5	10	15	25	40	65	100	150	250	400	650	1000	
A	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
B	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
C	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
D	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
E	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
F	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
G	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
H	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
J	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
K	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
L	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
M	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
N	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
P	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
Q	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
R	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

* 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 reinspect normal inspection (see 10.1.6).

Table 6-9 Double Sampling Plans for Normal Inspection (Table III-A of MIL-STD 105D)

Sample size code letter	Sample size	Sample size	Acceptable Quality Levels (normal inspection)																																									
			0.010		0.015		0.025		0.040		0.065		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		
A			↓																																									
B	2 First Second	2 4	↓																																									
C	3 First Second	3 6	↓																																									
D	5 First Second	5 10	↓																																									
E	8 First Second	8 16	↓																																									
F	13 First Second	13 26	↓																																									
G	20 First Second	20 40	↓																																									
H	32 First Second	32 64	↓																																									
J	50 First Second	50 100	↓																																									
K	80 First Second	80 160	↓																																									
L	125 First Second	125 250	↓																																									
M	200 First Second	200 400	↓																																									
N	315 First Second	315 630	↓																																									
P	500 First Second	500 1000	↓																																									
Q	800 First Second	800 1600	↓																																									
R	1250 First Second	1250 2500	↓																																									

* Use first sampling plan before error. If sample size equals or exceeds lot or batch size do 100 percent inspection.
 * Use first sampling plan above error.
 * Use corresponding single sampling plan for alternately, use double sampling plan below, where available.
 Re = Rejection number.

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

Sample size code letter	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		
A			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
B	2 First Second	2 4	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
C	3 First Second	3 6	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
D	5 First Second	5 10	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
E	8 First Second	8 16	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
F	13 First Second	13 26	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
G	20 First Second	20 40	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
H	32 First Second	32 64	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
J	50 First Second	50 100	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
K	80 First Second	80 160	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
L	125 First Second	125 250	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
M	200 First Second	200 400	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
N	315 First Second	315 630	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
P	500 First Second	500 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
Q	800 First Second	800 1600	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
R	1250 First Second	1250 2500	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
S	2000 First Second	2000 4000	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

- 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.
 * - Use corresponding single sampling plan for alternately, use double sampling plan below, where available.

Table 6-11 Double Sampling Plans for Reduced Inspection (Table III-C of MIL-STD 105D)*

Sample size code letter	Sample	Sample size	Cumulative 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	Ac Re	Ac Re			
A																																			
B																																			
C																																			
D	First Second	2 2	2 4																																
E	First Second	3 3	3 6																																
F	First Second	5 5	5 10																																
G	First Second	8 8	8																																
H	First Second	13 13	13 26																																
J	First Second	20 20	20 40																																
K	First Second	32 32	32 64																																
L	First Second	50 50	50 100																																
M	First Second	80 80	80 160																																
N	First Second	125 125	125 250																																
P	First Second	200 200	200 400																																
O	First Second	315 315	315 630																																
R	First Second	800 800	800 1600																																

↓ 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.

◊ Use corresponding single sampling plan for alternatively, use double sampling plan below, when available.

† If, after the second sample, the acceptance number has been exceeded, but the rejection number has not been reached, sample the lot, but continue normal inspection lot 100.