AN ANALYSIS OF THE LONG RANGE OPERATING CHARACTERISTICS OF THE MIL-STD-105D SAMPLING SCHEME AND SOME SUGGESTED MODIFICATIONS

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ABSTRACT

An integral part of the MIL-STD-105D scheme for sampling inspection by attributes is the transfer from normal inspection to reduced or tightened inspection when the historical record of inspected lots suggests unusually good or bad quality. The switching rules in MIL-STD-105D have been criticized, especially by Japanese manufacturers, as being too severe when what is defined as acceptable quality material is submitted. This paper examines the long range fraction of lots rejected for several MIL-STD-105D sampling plans by using the MIL-STD-105D switching rules, using a modification suggested by the Japanese Standards Association, and by using a second modification developed by the authors.

The Japanese Standards Association switching rules are more complex than those in MIL-STD-105D. It is demonstrated that they lead to improved long-range properties for Normal-Tightened-Reduced schemes, but to poorer properties for Normal-Tightened schemes.

A simplified set of switching rules is suggested, wherein the "limit numbers" in MIL-STD-105D are eliminated. In comparison to MIL-STD-105D, the simpler rules lead to a lower probability of rejection for good lots and a comparable probability of rejection for bad lots.

1. INTRODUCTION

The sampling scheme designated as MIL-STD-105D [4] has been widely adopted throughout the western world for lot-by-lot sampling inspection by attributes. The sampling plans in this document are indexed by lot size and by a number called the acceptable quality level (AQL). The AQL is specified by the consumer. The AQL is a designated percentage defective which, if met by the supplier, will lead to acceptance of the great majority of lots [4, sec. 4.3]. MIL-STD-105D provides two parameters for each sampling plan, a sample size, n, and acceptance number, c. If c or fewer defectives are found in a random sample of size n, the lot is accepted.

Fundamental to the MIL-STD-105D scheme is the concept of "normal" and "tightened" inspection. Sampling inspection begins with the normal plan, and the user is required to maintain an historical record of the results for each lot inspected. If two out of any five consecutive lots are rejected, a switch to tightened inspection is required. Under tightened inspection, n is usually the same as for normal inspection, but c is reduced, decreasing the probability of acceptance for all incoming quality levels. Normal inspection may be resumed if five consecutive lots are accepted. If tightened inspection continues for 10 consecutive lots, then sampling inspection must be discontinued.

An optional feature of MIL–STD–105D is the provision for "reduced" inspection when the historical quality record is unusually good. A move from normal to reduced inspection requires that the previous 10 lots have been accepted and that the total number of defectives in the 10 lots does not exceed a set of "limit numbers." Some examples are shown in Table 1.* Under reduced inspection, n is substantially decreased, and two numbers, c and r ($> c$) are supplied. Lots are accepted if the number of defectives is less than r, but normal inspection must be resumed if the number of defectives is more than c.

It is the contention of many critics of MIL–STD–105D that the switching rules are too severe when incoming quality is in the vicinity of the AQL. Furthermore, the switching rules are difficult to learn and administer, especially with respect to the transfer from normal to reduced inspection. The purpose of this paper is to examine some long-range operating characteristics of MIL–STD–105D and two alternative schemes which provide some modifications in the switching rules.

2. THE CONCEPT OF "LONG RANGE" O.C. CURVES

It is clear that tightened, normal, and reduced inspection will each have a different probability of acceptance for a given incoming lot quality. Hence, the long-range proportion of lots accepted will be dependent on the proportion of lots inspected under each plan.

It is traditional in the literature of quality control to examine the performance of an attributes sampling plan under the assumption that, when the process is "in control," a stream of product is being produced with a fixed probability, p, that each item is defective (see Duncan [2, p. 147] or Grant and Leavenworth [3, p. 364]). The value of p for a specific manufacturing process is often well established. We may think of p as a parameter of the in-control process. Even if fraction defective is not a constant from lot to lot in a particular process, the long-range O.C. curve is of considerable value. For example, the vendor may be able to set a value of p as an upper bound of fraction defective for his process, whereupon the long-range O.C. curve provides an upper bound for fraction of lots rejected.

3. METHODS AND ASSUMPTIONS

In a previous paper [1], we have described the theoretical basis for development of a long-range O.C. curve for the MIL–STD–105D scheme. Tightened and reduced inspection are treated as Markov chains, and normal inspection as a semi-Markov chain. If the process percent defective is nonzero, the MIL–STD–105D scheme leads to repeated visits to tightened inspection, and eventually to tightened inspection of 10 consecutive lots and the discontinuation of sampling inspection. We assume that, when this occurs, the next 10 lots will be treated as *rejected* lots and subjected to 100 percent inspection, after which normal sampling inspection may be resumed.

4. PROPOSED MODIFICATIONS

Ohmae [5] described some changes in the switching rules which were claimed to lead to a high probability of acceptance for AQL quality lots with a smaller probability than MIL–STD–105D of invoking tightened inspection for such lots. The Ohmae modifications eventually led to a new set of switching rules, which have been adopted by the Japanese Standards Association. These changes are shown in Table 2.

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*See tables at end of paper.

It is apparent that the Ohmae proposals make the switching rules for transfer from normal to tightened inspection more complicated than the original MIL–STD–105D scheme through the introduction of another set of limit numbers, and that the principal effect will be to alter the probability of a transfer to tightened inspection for all quality levels, and to decrease the probability of discontinuing sampling inspection when tightened inspection is adopted.

We suggest a different modification, also shown in Table 2. Limit numbers for transfer to reduced or tightened inspection are completely eliminated. Lots are viewed as a series of discrete subsets of five. Two consecutive subsets with no rejections are required to reach reduced inspection, unless there has been a rejection under normal inspection. Whenever a rejection occurs under normal inspection, the next four lots must be accepted to prevent a transfer to tightened inspection. If these four lots are accepted, then two additional subsets of five lots with no rejections are required to reach reduced inspection.

5. RESULTS

We have examined the long-range fraction of lots accepted under the three schemes for several lot sizes and for four values of AQL—0.4-, 1.0-, 1.5-, and 2.5-percent defective. At each AQL, the incoming quality level was chosen as 0.2 AQL, 0.6 AQL, 0.8 AQL, 1.2 AQL, 2.0 AQL, and 3.0 AQL.

Normal-Tightened Schemes

Table 3 shows the results for a sampling scheme wherein only normal and tightened inspection are employed.

The Japanese modification has the undesirable characteristic of decreasing, for all AQL's investigated, the fraction of lots accepted when material of AQL or better quality is submitted.

The authors' proposed modification leads to virtually the same long range O.C. curve as MIL–STD–105D.

Normal-Tightened-Reduced Schemes

Table 4 shows the results for the three schemes when reduced inspection is included. Referring to the limit numbers (Table 1) for transfer to reduced inspection, it is apparent that the user of these plans has an option regarding reduced inspection when small lots are inspected (as indicated by the asterisk in Table 1). He may interpret Table 1 as forbidding the use of reduced inspection for these cases, or as permitting the inclusion of more than 10 lots to achieve the necessary sample size. In the former case, the results from Table 3 for these lot sizes should be used. Table 4 has been constructed under the assumption that for plans labeled with an asterisk in Table 1, more than 10 lots may be used to obtain sufficient items.

Where reduced inspection is included, Table 4 shows that, in general, the Japanese modifications provide superior long range O.C. curves to those of MIL–STD–105D. For lots of AQL quality or better, the fraction of lots accepted is nearly always higher than MIL–STD–105D, while for poorer quality lots, the fraction accepted becomes lower than MIL–STD–105D.

The authors' suggested modification is usually even better than the Japanese plan with respect to acceptance of lots at AQL quality or better, but the fraction of poorer quality lots accepted is a little higher, usually comparable to that provided by MIL–STD–105D. This simpler approach, without the complication of limit numbers, appears to satisfy the objective of accepting more high quality lots while retaining the long range operating characteristics of MIL–STD–105D for poorer quality lots.

A subsidiary advantage of the authors' scheme is worth mentioning. The elimination of limit numbers not only simplifies record keeping, but also permits a complete analysis of the normal sampling scheme as a pure Markov chain. Under these conditions, long range O.C. curves may be obtained without costly iterative solution required for semi Markov analyses.

TABLE 1. *Limit numbers from MIL-STD-105D, Table VIII for transfer from normal to reduced inspection. Numbers in body of table are maximum defective in most recent 10 lots*

Number of items in last 10 lots	AQL 0.40	AQL 1.0	AQL 1.5	AQL 2.5	Number of items in last 10 lots	AQL 0.40	AQL 1.0	AQL 1.5	AQL 2.5
20–29	*	*	*	*	320–499	*	0	1	4
30–49	*	*	*	*	500–799	0	2	3	7
50–79	*	*	*	*	800–1,249	0	4	7	14
80–129	*	*	*	0	1,250–1,999	2	8	13	24
130–199	*	*	0	0	2,000–3,149	4	14	22	40
200–319	*	0	0	2	3,150–4,999	8	25	38	67

*MIL–STD–105D requires at least 200 items to be inspected, so the number of items in last 10 lots is not sufficient to qualify for reduced inspection. In these instances, more than 10 lots may be used, if desired.

TABLE 2.—*Switching rules for MIL–STD–105D and two suggested modifications*

Switch	MIL–STD–105D	Japanese modification	Authors' proposed modification
Normal to tightened	2 out of any 5 consecutive lots rejected.	a. A lot is rejected *and* b. Total defectives in last 5 lots ≥ limit number.*	Rejected lot, followed by a second rejection in the following 4 lots
Tightened to normal	5 consecutive lots accepted.	No change	No change from 105D.
Tightened to "Discontinue"	10 consecutive lots remain on tightened.	Number of cumulative lots rejected under tightened reaches 5.	No change from 105D.
Normal to Reduced	a. 10 consecutive lots accepted and *and* b. Total defectives in the 10 lots ≤ limit number. *and* c. Production at a steady rate *and* d. Reduced inspection is deemed desirable.	No change, except that limit numbers are reduced.	a. 10 consecutive lots accepted from the beginning of normal inspection. *or* b. 14 consecutive lots accepted after a rejection during normal inspection c. and d. same as 105D.
Reduced to Normal	Any lot with more than c defectives.	No change in switching rules, except limit number, c, for plans with $r=2$, is altered from 0 to 1.	

*The new limit numbers are the upper 0.5-percent probability points from the Poisson distribution, assuming that AQL quality material has been submitted.

TABLE 3. *Long range operating characteristics of three sampling schemes employing normal and tightened inspection (MIL-STD-105D general inspection level II)*

AQL = 0.4 percent

Lot size code letter	Incoming percent defective	Fractions of lots accepted		
		MIL-STD-105D	Japanese Standard Assn.	Authors' modification
G	0.08	0.974	0.969	0.975
	0.24	0.905	0.895	0.913
	0.32	0.856	0.846	0.870
	0.40	0.802	0.789	0.817
	0.48	0.746	0.729	0.761
	0.80	0.553	0.516	0.559
	1.20	0.403	0.352	0.404
K	0.08	0.995	0.993	0.995
	0.24	0.958	0.938	0.961
	0.32	0.915	0.880	0.926
	0.40	0.845	0.792	0.865
	0.48	0.754	0.686	0.776
	0.80	0.429	0.348	0.433
	1.20	0.233	0.178	0.233
L	0.08	0.999	0.995	0.999
	0.24	0.986	0.951	0.987
	0.32	0.966	0.898	0.971
	0.40	0.925	0.816	0.941
	0.48	0.854	0.716	0.883
	0.80	0.477	0.367	0.487
	1.20	0.237	0.173	0.238
M	0.08	1.000	0.999	1.000
	0.24	0.992	0.978	0.993
	0.32	0.979	0.949	0.980
	0.40	0.949	0.893	0.957
	0.48	0.886	0.801	0.907
	0.80	0.452	0.362	0.458
	1.20	0.193	0.143	0.193
N	0.08	1.000	1.000	1.000
	0.24	0.998	0.985	0.998
	0.32	0.994	0.959	0.994
	0.40	0.981	0.895	0.983
	0.48	0.943	0.778	0.958
	0.80	0.440	0.283	0.450
	1.20	0.133	0.081	0.133

TABLE 3. *Long range operating characteristics of three sampling schemes employing normal and tightened inspection (MIL–STD–105D general inspection level II)* — Continued

AQL = 1.0 Percent

Lot size code letter	Incoming percent defective	Fraction of lots accepted		
		MIL–STD–105D	*Japanese* Standards Assn.	Authors' modification
E	0.2	0.974	0.969	0.974
	0.6	0.904	0.894	0.912
	0.8	0.854	0.845	0.867
	1.0	0.799	0.788	0.814
	1.2	0.743	0.728	0.757
	2.0	0.550	0.514	0.556
	3.0	0.400	0.351	0.402
H	0.2	0.995	0.993	0.995
	0.6	0.958	0.938	0.961
	0.8	0.915	0.880	0.926
	1.0	0.845	0.792	0.865
	1.2	0.754	0.686	0.776
	2.0	0.429	0.348	0.433
	3.0	0.233	0.178	0.233
J	0.2	0.999	0.995	0.999
	0.6	0.986	0.951	0.987
	0.8	0.966	0.898	0.971
	1.0	0.925	0.816	0.941
	1.2	0.854	0.716	0.883
	2.0	0.477	0.367	0.487
	3.0	0.237	0.173	0.238
K	0.2	1.000	0.999	1.000
	0.6	0.993	0.979	0.993
	0.8	0.980	0.950	0.981
	1.0	0.951	0.896	0.958
	1.2	0.890	0.806	0.910
	2.0	0.459	0.368	0.465
	3.0	0.196	0.145	0.196
L	0.2	1.000	1.000	1.000
	0.6	0.998	0.985	0.998
	0.8	0.994	0.959	0.994
	1.0	0.981	0.895	0.983
	1.2	0.943	0.778	0.958
	2.0	0.440	0.283	0.450
	3.0	0.133	0.081	0.133

TABLE 3. *Long range operating characteristics of three sampling schemes employing normal and tightened inspection (MIL-STD-105D general inspection level II)* — Continued

AQL = 1.5 percent

Lot size code letter	Incoming percent defective	Fractions of lots accepted		
		MIL-STD-105D	Japanese Standards Assn.	Authors' modification
D	0.3	0.976	0.970	0.976
	0.9	0.911	0.900	0.920
	1.2	0.866	0.853	0.880
	1.5	0.815	0.799	0.831
	1.8	0.762	0.741	0.777
	3.0	0.571	0.530	0.578
	4.5	0.418	0.364	0.420
G	0.3	0.996	0.993	0.996
	0.9	0.962	0.945	0.965
	1.2	0.925	0.896	0.934
	1.5	0.864	0.820	0.882
	1.8	0.782	0.724	0.803
	3.0	0.460	0.382	0.465
	4.5	0.255	0.197	0.255
H	0.3	0.999	0.996	0.999
	0.9	0.989	0.958	0.989
	1.2	0.973	0.914	0.976
	1.5	0.941	0.845	0.953
	1.8	0.884	0.755	0.919
	3.0	0.527	0.408	0.540
	4.5	0.268	0.196	0.269
J	0.3	1.000	0.999	1.000
	0.9	0.994	0.981	0.994
	1.2	0.982	0.956	0.983
	1.5	0.958	0.910	0.964
	1.8	0.908	0.831	0.925
	3.0	0.495	0.401	0.503
	4.5	0.216	0.161	0.217
K	0.3	1.000	1.000	1.000
	0.9	0.999	0.988	0.999
	1.2	0.995	0.968	0.996
	1.5	0.986	0.921	0.987
	1.8	0.962	0.827	0.970
	3.0	0.515	0.338	0.533
	4.5	0.166	0.101	0.166

TABLE 3. *Long range operating characteristics of three sampling schemes employing normal and tightened inspection (MIL–STD–105D general inspection level II)* — Continued

AQL = 2.5 Percent

Lot size code letter	Incoming percent defective	Fractions of lots accepted		
		MIL–STD–105D	Japanese Standards Assn.	Authors' modification
C	0.5	0.975	0.969	0.975
	1.5	0.907	0.896	0.916
	2.0	0.851	0.847	0.873
	2.5	0.806	0.791	0.821
	3.0	0.750	0.731	0.766
	5.0	0.558	0.518	0.564
	7.5	0.407	0.354	0.408
F	0.5	0.995	0.993	0.995
	1.5	0.958	0.938	0.961
	2.0	0.915	0.880	0.926
	2.5	0.845	0.792	0.865
	3.0	0.754	0.686	0.776
	5.0	0.429	0.348	0.433
	7.5	0.233	0.178	0.233
G	0.5	0.999	0.995	0.999
	1.5	0.986	0.951	0.987
	2.0	0.966	0.898	0.971
	2.5	0.925	0.816	0.941
	3.0	0.854	0.716	0.883
	5.0	0.477	0.367	0.487
	7.5	0.237	0.173	0.238
H	0.5	1.000	0.999	1.000
	1.5	0.993	0.979	0.993
	2.0	0.980	0.950	0.981
	2.5	0.951	0.896	0.958
	3.0	0.890	0.806	0.920
	5.0	0.459	0.368	0.465
	7.5	0.196	0.145	0.196
J	0.5	1.000	1.000	1.000
	1.5	0.998	0.985	0.998
	2.0	0.994	0.959	0.994
	2.5	0.981	0.895	0.983
	3.0	0.943	0.778	0.958
	5.0	0.440	0.283	0.450
	7.5	0.133	0.081	0.133

TABLE 4. *Long range operating characteristics of three sampling schemes employing normal, tightened and reduced inspection (MIL-STD-105D general inspection level II)*

AQL = 0.4 percent

Lot size code letter	Incoming percent defective	Fractions of lots accepted		
		MIL-STD-105D	Japanese Standards Assn.	Authors' modification
G*	0.08	0.987	0.987	0.988
	0.24	0.935	0.942	0.944
	0.32	0.889	0.901	0.902
	0.40	0.832	0.846	0.852
	0.48	0.770	0.780	0.792
	0.80	0.559	0.531	0.571
	1.20	0.403	0.355	0.407
K	0.08	0.998	0.999	0.998
	0.24	0.970	0.983	0.972
	0.32	0.930	0.947	0.935
	0.40	0.859	0.871	0.870
	0.48	0.764	0.755	0.778
	0.80	0.430	0.355	0.434
	1.20	0.233	0.178	0.233
L	0.08	1.000	1.000	1.000
	0.24	0.996	0.991	0.997
	0.32	0.984	0.972	0.989
	0.40	0.947	0.933	0.968
	0.48	0.871	0.852	0.916
	0.80	0.478	0.384	0.498
	1.20	0.237	0.173	0.238
M	0.08	1.000	1.000	1.000
	0.24	0.997	0.994	0.998
	0.32	0.986	0.981	0.991
	0.40	0.957	0.955	0.971
	0.48	0.892	0.984	0.919
	0.80	0.452	0.370	0.460
	1.20	0.193	0.143	0.193
N	0.08	1.000	1.000	1.000
	0.24	1.000	0.999	1.000
	0.32	0.996	0.994	0.998
	0.40	0.983	0.981	0.993
	0.48	0.945	0.938	0.970
	0.80	0.440	0.294	0.641
	1.20	0.133	0.081	0.133

*16 lots required to meet minimum sample assignment of Table VIII for AQL = 0.4, 1.0, 2.5. 17 lots required for AQL = 1.5.

TABLE 4. *Long range operating characteristics of three sampling schemes employing normal, tightened and reduced inspection (MIL–STD–105D general inspection level II)* — Continued

AQL = 1.0 Percent

Lot size code letter	Incoming percent defective	Fractions of lots accepted		
		MIL–STD–105D	Japanese Standards Assn.	Authors' modification
E*	0.2	0.987	0.988	0.988
	0.6	0.935	0.942	0.944
	0.8	0.889	0.901	0.904
	1.0	0.831	0.845	0.855
	1.2	0.768	0.778	0.791
	2.0	0.556	0.529	0.568
	3.0	0.401	0.353	0.404
H	0.2	0.998	0.999	0.998
	0.6	0.970	0.983	0.972
	0.8	0.930	0.947	0.935
	1.0	0.859	0.871	0.870
	1.2	0.764	0.755	0.778
	2.0	0.430	0.355	0.434
	3.0	0.233	0.178	0.233
J	0.2	1.000	1.000	1.000
	0.6	0.996	0.991	0.997
	0.8	0.984	0.972	0.989
	1.0	0.947	0.933	0.968
	1.2	0.871	0.852	0.916
	2.0	0.478	0.384	0.498
	3.0	0.237	0.173	0.238
K	0.2	1.000	1.000	1.000
	0.6	0.997	0.994	0.998
	0.8	0.985	0.982	0.991
	1.0	0.956	0.956	0.972
	1.2	0.894	0.898	0.922
	2.0	0.459	0.377	0.468
	3.0	0.196	0.146	0.197
L	0.2	1.000	1.000	1.000
	0.6	1.000	0.999	1.000
	0.8	0.996	0.994	0.998
	1.0	0.983	0.981	0.993
	1.2	0.945	0.938	0.970
	2.0	0.440	0.294	0.641
	3.0	0.133	0.081	0.133

*16 lots required to meet minimum sample assignment of Table VIII for AQL = 0.4, 1.0, 2.5. 17 lots required for AQL = 1.5.

TABLE 4. *Long range operating characteristics of three sampling schemes employing normal, tightened and reduced inspection (MIL-STD-105D general inspection level II)* — Continued

AQL = 1.5 Percent

Lot size code letter	Incoming percent defective	Fractions of lots accepted		
		MIL-STD-105D	Japanese Standards Assn.	Authors' modification
D*	0.3	0.989	0.989	0.990
	0.9	0.942	0.948	0.952
	1.2	0.900	0.911	0.917
	1.5	0.847	0.860	0.871
	1.8	0.788	0.797	0.815
	3.0	0.577	0.549	0.595
	4.5	0.419	0.367	0.424
G	0.3	0.998	0.999	0.998
	0.9	0.970	0.985	0.975
	1.2	0.933	0.955	0.943
	1.5	0.871	0.893	0.888
	1.8	0.786	0.793	0.806
	3.0	0.460	0.391	0.466
	4.5	0.255	0.197	0.255
H	0.3	1.000	1.000	1.000
	0.9	0.997	0.994	0.998
	1.2	0.985	0.978	0.992
	1.5	0.955	0.949	0.977
	1.8	0.895	0.888	0.940
	3.0	0.527	0.437	0.556
	4.5	0.268	0.197	0.269
J	0.3	1.000	1.000	1.000
	0.9	0.998	0.995	0.998
	1.2	0.988	0.984	0.993
	1.5	0.964	0.963	0.977
	1.8	0.912	0.917	0.938
	3.0	0.495	0.415	0.506
	4.5	0.216	0.161	0.217
K	0.3	1.000	1.000	1.000
	0.9	1.000	0.999	1.000
	1.2	0.997	0.996	0.999
	1.5	0.988	0.987	0.995
	1.8	0.963	0.961	0.982
	3.0	0.514	0.361	0.539
	4.5	0.166	0.101	0.166

*16 lots required to meet minimum sample assignment of Table VIII for AQL = 0.4, 1.0, 2.5. 17 lots required for AQL = 1.5.

TABLE 4. *Long range operating characteristics of three sampling schemes employing normal, tightened and reduced inspection (MIL–STD–105D general inspection level II)* — Continued

AQL = 2.5 percent

Lot size code letter	Incoming percent defective	Fractions of lots accepted		
		MIL–STD–105D	Japanese Standards Assn.	Authors' modification
C*	0.5	0.987	0.988	0.988
	1.5	0.938	0.944	0.946
	2.0	0.893	0.905	0.908
	2.5	0.838	0.850	0.858
	3.0	0.777	0.785	0.799
	5.0	0.564	0.534	0.578
	7.5	0.407	0.357	0.411
F	0.5	0.998	0.999	0.998
	1.5	0.970	0.983	0.972
	2.0	0.930	0.947	0.935
	2.5	0.859	0.871	0.870
	3.0	0.764	0.755	0.778
	5.0	0.430	0.355	0.434
	7.5	0.233	0.178	0.233
G	0.5	1.000	1.000	1.000
	1.5	0.996	0.991	0.997
	2.0	0.984	0.972	0.989
	2.5	0.946	0.933	0.967
	3.0	0.871	0.852	0.915
	5.0	0.478	0.384	0.497
	7.5	0.237	0.173	0.238
H	0.5	1.000	1.000	1.000
	1.5	0.997	0.994	0.998
	2.0	0.985	0.982	0.991
	2.5	0.956	0.956	0.972
	3.0	0.894	0.898	0.922
	5.0	0.459	0.377	0.467
	7.5	0.196	0.146	0.197
J	0.5	1.000	1.000	1.000
	1.5	1.000	0.999	1.000
	2.0	0.996	0.994	0.998
	2.5	0.983	0.981	0.992
	3.0	0.945	0.938	0.970
	5.0	0.440	0.294	0.454
	7.5	0.133	0.081	0.134

*16 lots required to meet minimum sample assignment of Table VIII for AQL = 0.4, 1.0, 2.5. 17 lots required for AQL = 1.5.

REFERENCES

[1] Brown, G. and H. Rutemiller, "A Cost Analysis of Sampling Inspection Under Military Standard 105D," Nav. Res. Log. Quart. *20*, 181 (Mar. 1973).

[2] Duncan, A. J., *Quality Control and Industrial Statistics* (R. C. Irwin and Co., Homewood, Illinois, 1965).

[3] Grant, E. L. and R. S. Leavenworth, *Statistical Quality Control* (McGraw-Hill, New York, 1972).

[4] *MIL–STD–105D 29 April, 1963 Military Standard—Sampling Procedures and Tables for Inspection by Attributes.* Washington, D.C.: United States Government Printing Office (1962).

[5] Ohmae, U., and R. Suga, "Basic Policy and Scheme on Modified MIL–STD–105D," International Conference on Quality Control, Tokyo (1969).