Six Sigma Modified Quick Switching Variables Sampling System of type SSMQSVS (n_σ; $k_{T\sigma}$, $k_{N\sigma}$) Indexed by Six Sigma AQL and Six Sigma AOQL

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Abstract— **The procedure and tables are given for the selection of Six Sigma Modified Quick Switching Variables Sampling System indexed by Six Sigma AQL and Six Sigma AOQL. The resulting system is referred as a "Six Sigma Modified Quick Switching Variables Sampling System" (SSQSVSS-r(n_σ; $k_{T\sigma}$, $k_{N\sigma}$), r= 2 and 3). The design procedure constructed tables for easy selection of system given indexed by six sigma quality levels by known and unknown σ respectively.**

Keywords: **Modified Quick Switching Sampling System, Six Sigma, AOQ, AOQL, Six Sigma AQL and Six Sigma AOQL.**

I. INTRODUCTION

The construction procedure for the SSQSVSS ($n_{T\sigma}$, $n_{N\sigma}$; k_σ), r=2 and 3, indexed by SSAQL and SSAOQL is based on Govindaraju (1990) procedures and tables, developing for the selection of single sampling plan for variables indexed by AQL and AOQL. Soundararajan (1981) has developed procedures and tables for the selection of single sampling plans for attributes for given AQL and AOQL. Govindaraju (1990) has developed procedures and tables for the selection of single sampling plans for variables indexed by AQL and AOQL. Later Soundarajan and Palanivel (2000) have developed procedures and tables for the selection of quick switching single sampling variables systems indexed by AQL and AOQL. Based on above article Senthilkumar and Esha Raffie (2017) have constructed SSQSVSS (n_σ; $k_{T\sigma}$, $k_{N\sigma}$) indexed by Six Sigma AQL and Six Sigma AOQL. Senthilkumar and Esha Raffie (2016) have constructed six sigma modified quick switching variables sampling system [SSMQSVSS-r (nTσ, nNσ; kσ), r=2 and 3] indexed by six sigma quality levels of SSAQL and SSLQL. This concept can be extended to variables quality characteristics of the study, the resulting plan would be designated as SSQSVSS-r and would be applied under the following conditions:

- The production is steady, so that results on current and preceding lots are broadly indicative of a continuous process.
- Lots are submitted substantially in the order of production.
- Inspection is by variables, with the quality being defined as the fraction of non- conforming.
- The sample units are selected from a large lot and production is continuous.
- The production process depends on automation and human involvement in the process is negligible.
- The industry may adopt system method with decision makers have an experience in adopting the six sigma quality initiatives.

Basic Assumptions

- The quality characteristic is represented by a random variable X measurable on a continuous scale.
- Distribution of X is normal with mean and standard deviation.
- An upper limit U, has been specified and a product is qualified as defective when X>U. [when the lower limit L is Specified, the product is a defective one if X<L].
- The Purpose of inspection is to control the fraction defective, p in the lot inspected.

When the conditions listed above are satisfied the fraction defective in a lot will be defined by $p= 1-F(v)=F(-v)$ with $v=(U-\mu)/\sigma$ and

$$F(y) = \int_{-\infty}^{y} \frac{1}{\sqrt{2\pi}} e^{-z^2/2}\, dz \tag{1}$$

where z ~ N (0, 1). Here the decision criterion for the σ-method variables plan is to accept the lot if $\overline{X} + k\sigma \le U$, where U is the upper specification limit or if $\overline{X} + k\sigma \ge L$, where L is the lower specification limit.

II. SSQSVSS-r((n_σ; $k_{T\sigma}$, $k_{N\sigma}$), WHERE r=2 AND 3) WITH KNOWN σ FOR GIVEN SSAQL AND SSLQL

The Six Sigma Modified Quick Switching Variables Sampling System with known σ variables plan as the reference plan has following Operating Procedure

Operating Procedure

Step 1: Draw a sample of size n_σ from the lot through normal inspection, inspect and record the measurement of the quality characteristic for each unit of the sample. Compute the sample mean $\overline{X}$.

Step 2: If $\overline{X} + k_{N\sigma}\sigma \le U$ or $\overline{X} + k_{N\sigma}\sigma \ge L$ accept the lot and repeat Step 1 otherwise, go to Step 3.

Step 3: Under tightened inspection, draw a sample of size n_σ from the next lot inspect and record the measurement of the quality characteristic for each unit of the sample. Compute the sample mean $\overline{X}$.

Step 4: If $\overline{X} + k_{T\sigma}\sigma \le U$ or $\overline{X} + k_{T\sigma}\sigma \ge L$ accept the lot. When r consecutive lots are accepted, switch to Step 1, otherwise repeat Step 3.

Where $k_{N\sigma}$ and $k_{T\sigma}$ are the acceptance criterion of the variable sampling plan under normal and tightened inspection respectively. Tightened inspection may be achieved by reducing k_N but leaving n_σ fixed. This moves the OC curve to the left, thus reducing the consumer's risk but increasing the producer's risk. Under σ-method $\overline{X}$ and σ are the average quality characteristic and standard deviation respectively.

III. VARIABLE SAMPLING PLAN AND SSAOQL PROCEDURES

The fraction defective of SSQSVSS-r(n_σ; k_T, k_N), r= 2 and 3 in a given lot is

$$p = F(-v)$$

with $$v = (U-\mu)/\sigma$$

and its probability of acceptance has been in (2) and (3)

with $$w_N = (v - k_{N\sigma})\sqrt{n_\sigma}$$

and $$w_T = (v - k_{T\sigma})\sqrt{n_\sigma}$$

If the quality of the accepted lot is p and all defective units found in the rejected lots are replaced by non-defective units in a rectifying inspection plan, the Six Sigma average outgoing quality (SSAOQ) can be approximated as

$$SSAOQ = pP_a(p) \qquad (3)$$

If p_m is the proportion nonconforming items at which SSAOQ is maximum, one has

$$SSAOQL = p_m P_a(p_m) \qquad (4)$$

If SSAQL (p_1) is prescribed, then the corresponding value of v_{SSAQL} or v_1 will be fixed and if $P_a(p)$ is fixed at 99.99966%, that is (1-α), where, α = 0.0000034x10$^-$ Hence we have

$$P_a(p_1) = (1-\alpha)$$

So that for given values of n_σ, w_N, w_T and SSAQL, $k_{T\sigma,}$ $k_{N\sigma}$ are determined.

IV. SELECTION OF SSQSVSS-r(n_σ; $k_{T\sigma,}$ $k_{N\sigma}$), r=2 AND 3, WITH KNOWN σ FOR GIVEN SSAQL AND SSAOQL

Table 1 is used for selection of σ- method SSQSVSS-2(n_σ; $k_{T\sigma,}$ $k_{N\sigma}$). For example, if the SSAQL is fixed at = 0.000002 and the SSAOQL is fixed at 0.000003, Table 1 yields n_σ = 2564, $k_{T\sigma}$ = 4.243 and $k_{N\sigma}$ =4.093, which is associated with 4.7 sigma level of SSQSVSS-2 (n_σ; $k_{T\sigma}$, $k_{N\sigma}$).

Table 2 is used for selection of σ- method SSQSVSS-3(n_σ; $k_{T\sigma}$, $k_{N\sigma}$). For example, if the SSAQL is fixed at = 0.000005 and the SSAOQL is fixed at 0.000006, Table 2 yields n_σ = 2091, $k_{T\sigma}$ = 3.969 and $k_{N\sigma}$ =3.819, which is associated with 4.5 sigma level of SSQSVSS-3 (n_σ; $k_{T\sigma}$, $k_{N\sigma}$).

The user of Table 1 and Table 2 should understand the limitations of plans indexed by SSAOQL. Sampling with rectifying of rejected lots on the one hand reduces the average percentage of nonconforming items in the lots, but on the other hand introduces non-homogeneity in the series of lots finally accepted. That is, any particular lot will have a quality of p% or 0% nonconforming depending on whether the lot is accepted or rectified. Thus the assumption underlying the SSAOQL principle is that the homogeneity in the qualities of individual lots is unimportant and only the average quality matters. For plans listed in Table 3 and Table 4, if the individual lot quality happens to be the product quality p_m at which SSAOQL occurs, then the associated probability of acceptance will be poor. Table 4 gives $P_a(p_m)$ values of plans given in Table 2. For example, for SSAQL is 0.00001 and SSAOQL is 0.00002, Table 4 gives $P_a(p_m)$ = 0.64. Then p_m = SSAOQL/ $P_a(p_m)$ = 0.00003 and Table 3 gives $P_a(p_m)$ values of plans given in Table 2. For example, for SSAQL is 0.00005 and SSAOQL is 0.00006, Table 4 gives $P_a(p_m)$ = 0.65. Then p_m = SSAOQL/ $P_a(p_m)$ = 0.00009.

In order to avoid such inconvenience, the producer should maintain the process quality more or less at the SSAQL. The high rate of rejection of lots at p = p_m will also indirectly put pressure on the producer to improve the submitted quality.

V. SELECTION OF SSQSVSS-r(n_S; k_{TS}, k_{NS}), WHERE r=2 AND 3, WITH UNKNOWN σ FOR GIVEN SSAQL AND SSLQL

If the population standard deviation σ is unknown, then it is estimated from the sample standard deviation S (n-1 as the divisor). If the sample size of the unknown sigma variables system (S method) is n_s and the acceptance parameters are k_N and k_T, then the operating procedure is as follows

The steps involved in this procedure are as follows

Step 1: Draw a sample of size n_s from the lot, inspect and record the measurement of the quality characteristic for each unit of the sample. Compute the sample mean $\overline{X}$ and sample standard deviation S.

Step 2: If $\overline{X} + k_{Ns} S \le U$ or $\overline{X} + k_{Ns} S \ge L$ accept the lot and repeat Step 1 otherwise go to Step 3.

Step 3: Draw a sample of size n_s from the next lot inspect and record the measurement of the quality characteristic for each unit of the sample. Compute the sample mean $\overline{X}$ sample standard deviation S.

Step 4: If $\overline{X} + k_{TS} S \le U$ or $\overline{X} + k_{TS} S \ge L$ accept the lot. When r consecutive lots are accepted, switch to Step 1, otherwise repeat Step 3.

where $\overline{X}$ and S are the average and the standard deviation of quality characteristic respectively from the sample.

VI. SELECTION OF SSQSVSS-r(n_σ; $k_{T\sigma}$, $k_{N\sigma}$), r = 2 AND 3, WITH UNKNOWN σ FOR GIVEN SSAQL AND SSAOQL

Table 1 also gives such matched S-method plan. For example, for given SSAQL is 0.00001 and SSAOQL is 0.0002, one obtains the parameters of the S-method plan from Table 1 to be $n_s = 202$, $k_{T\sigma} = 2.515$ and $k_{N\sigma} = 2.365$, which is associated with 4.7 sigma level of SSQSVSS-2(n_σ; $k_{T\sigma}$, $k_{N\sigma}$).

Table 2 also gives such matched S-method plan. For example, for given SSAQL is 0.00001 and SSAOQL is 0.00008, one obtains the parameters of the S-method plan from Table 2 to be $n_s = 397$, $k_{T\sigma} = 3.098$ and $k_{N\sigma} = 2.948$, which is associated with 4.7 sigma level of SSQSVSS-3(n_σ; $k_{T\sigma}$, $k_{N\sigma}$).

VII. CONSTRUCTION OF TABLE 1 AND TABLE 2

For constructing Table 1 and 2, a trial value of p_m is assumed and the probability of acceptance at p_m is found equation

$$P_a(p_m) = SSAOQL / p_m$$

The auxiliary variables v_m, w_{Nm} and w_{Tm} corresponding to the values of p_m and $P_a(p_m)$ respectively, are found using (1), (2), (3), and (4). For given values of p_1, determine the values of v_1, w_N and w_T using the approximation (Abramwitz and Stegun (1972)) for the ordinate of the cumulative normal distribution. With the values of v_m, w_{Nm} and w_{Tm}, the following equation is used for calculating n_σ.

SSQSVSS-2, formula of n_σ is

$$\sqrt{n_\sigma} = [AOQL / (p_m^2((1-P_N)(1-P_N+2P_T)\sqrt{(\exp(v_m^2 - w_T^2))} + P_T^2\sqrt{(\exp(v_m^2 - w_N^2))})) / (P_T^2 + (1-P_N)(1+P_T))^2)] \tag{5}$$

and SSQSVSS-3, formula of n_σ is

$$\sqrt{n_\sigma} = [AOQL/(p_m^2((X\sqrt{(\exp(v_m^2 - w_T^2}))+P_T^2\sqrt{(\exp(v_m^2 - w_N^2))}))/Y^2] \tag{6}$$

where

$$X = (3P_T^2 + 2P_T - 2P_N - 3P_N P_T^2 + 2P_N^2 P_T - 4P_N P_T + 1)$$

$$Y = P_T^3 + (1-P_N)(P_T^2 + P_T + 1)$$

with $P_N = \phi(w_N) = pr[(U-\bar{x}) / \sigma > k_{N\sigma}]$

and $P_T = \phi(w_T) = pr[(U-\bar{x}) / \sigma > k_{T\sigma}]$

Equations (5) and (6) are the formula for finding the sample size of a known σ SSQSVSS-r (n_σ; $k_{T\sigma}$, $k_{N\sigma}$), r = 2 and 3 system. For two points given on the OC curve it is then checked to see whether the assumed value of p_m corresponds to the proportion non-conforming at which the SSAOQL occurs or not. That is, it is checked to see whether or not the trial value of p_m satisfies the following conditions.

For SSQSVSS-2 condition is

$$AOQL - p_m^2((1-P_N)(1-P_N+2P_T)\sqrt{(n_\sigma \exp(v_m^2 - w_T^2))} - P_T^2(\sqrt{(n_\sigma \exp(v_m^2 - w_N^2))}) / (P_T^2 + (1-P_N)(1+P_T))^2) = 0 \tag{7}$$

and for SSQSVSS-3 condition is

$$AOQL/[p_m^2(((X\sqrt{(n_\sigma \exp(v_m^2 - w_T^2}))+P_T^2\sqrt{n_\sigma(\exp(v_m^2 - w_N^2))}))/Y^2)]=0 \tag{8}$$

where

$$X = (3P_T^2 + 2P_T - 2P_N - 3P_N P_T^2 + 2P_N^2 P_T - 4P_N P_T + 1)$$

$$Y = P_T^3 + (1-P_N)(P_T^2 + P_T + 1)$$

Equations (7) and (8) are obtained from the following relation

$$\frac{d(SSAOQ)}{dp} = P_a(p) + p\frac{dP_a(p)}{dp} = 0 \tag{9}$$

in which, for SSQSVSS-2

$$\frac{dP_a(P)}{dp} = ((1\text{-}P_N)(1\text{-}P_N + 2P_T)\sqrt{(n_\sigma \exp(v_m^2 - w_T^2))} - P_T^2(\sqrt{(n_\sigma \exp(v_m^2 - w_N^2))}) / (P_T^2 + (1-P_N)(1+P_T))^2 \quad (10)$$

and for SSQSVSS-3

$$\frac{dP_a(P)}{dp} = [(X\sqrt{(n_\sigma \exp(v_m^2 \text{-} w_T^2))} + P_T^2\sqrt{n_\sigma(\exp(v_m^2 \text{-} w_N^2))})/Y^2] \quad (11)$$

If assumed value of p_m does not satisfy (7) and (8), then another trial value of p_m is obtained from (7) and (8) by numerical methods. The methods of successive substitution is often found to give good results in equation (7) and (8) is rewritten for this purpose as

for SSQSVSS-2

$$p_m = AOQL / (p_m((1-P_N)(1-P_N + 2P_T)\sqrt{(n_\sigma \exp(v_m^2 - w_T^2))} + P_T^2(\sqrt{(n_\sigma \exp(v_m^2 - w_N^2))}) / (P_T^2 + (1-P_N)(1+P_T))^2) \quad (12)$$

and for SSQSVSS-3

$$p_m = AOQL/[p_m(X\sqrt{(n_\sigma \exp(v_m^2 \text{-} w_T^2))} + P_T^2\sqrt{n_\sigma(\exp(v_m^2 \text{-} w_N^2))})/Y^2)] \quad (13)$$

After determining the next trial value of p_m, again the values of v_m, w_{Nm}, w_{Tm} and n_σ are found and the conditions (7) and (8) are rechecked. This iterative procedure continues until the convergence of p_m is achieved. For obtaining the values of v_1, w_N and w_T, the approximation for the ordinate of the cumulative normal distribution available in Abramowitz and Stegun (1972) was used.

The S-method plans matching the σ-method plans were obtained using computer search routine through C++ programme. For selected combinations of SSAQL and SSAOQL, Table 1 and 2 was constructed following the above iterative procedure.

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Table 1: SSQSVSS-2 with known and unknown σ indexed by SSAQL and SSAOQL

SSAQL	SSAOQL	n_σ	$k_{T\sigma}$	$k_{N\sigma}$	σ - Level	n_s	k_{Ts}	k_{Ns}	σ - Level
0.000001	0.000002	1987	4.483	4.296	4.4	23202	4.483	4.296	5.1
	0.000003	1444	4.252	4.065	4.1	15358	4.252	4.065	4.8
	0.000004	901	4.168	3.981	4.0	9254	4.168	3.981	4.8
	0.000005	834	4.102	3.915	4.0	8331	4.102	3.915	4.8
	0.000006	767	4.047	3.860	4.0	7484	4.047	3.860	4.7
	0.000007	700	4.000	3.813	4.0	6693	4.000	3.813	4.7
	0.000008	633	3.983	3.796	4.0	6009	3.983	3.796	4.7
	0.000009	566	3.922	3.735	4.0	5232	3.922	3.735	4.7
0.000002	0.000003	2564	4.243	4.093	4.7	26717	4.243	4.093	5.3
	0.000004	1213	4.159	4.009	4.3	12199	4.159	4.009	4.9
	0.000005	1334	4.093	3.943	4.1	13048	4.093	3.943	4.8
	0.000006	1227	4.038	3.888	4.1	11719	4.038	3.888	4.8
	0.000007	1120	3.991	3.841	4.1	10479	3.991	3.841	4.8
	0.000008	1013	3.974	3.824	4.1	9309	3.974	3.824	4.8
	0.000009	906	3.913	3.763	4.1	8190	3.913	3.763	4.8
0.000003	0.000004	3033	4.150	4.000	4.4	29614	4.150	4.000	5.1
	0.000005	1735	4.084	3.934	4.2	16465	4.084	3.934	4.9
	0.000006	1595	4.029	3.879	4.2	14785	4.029	3.879	4.8
	0.000007	1456	3.982	3.832	4.1	13212	3.982	3.832	4.8
	0.000008	1317	3.965	3.815	4.1	11734	3.965	3.815	4.8
	0.000009	1087	3.904	3.754	4.1	9528	3.904	3.754	4.8
	0.00009	37	3.003	2.853	4.0	224	3.006	2.856	4.6
	0.0001	30	2.821	2.671	4.0	180	2.825	2.675	4.6
0.000004	0.000005	3643	4.075	3.925	4.3	31976	4.075	3.925	4.9
	0.000006	1755	4.020	3.870	4.3	15022	4.020	3.870	4.9
	0.000007	1602	3.973	3.823	4.3	13425	3.973	3.823	4.9
	0.000008	1448	3.956	3.806	4.2	11902	3.956	3.806	4.9
	0.000009	1413	3.895	3.745	4.2	11423	3.895	3.745	4.8
	0.00001	1246	3.863	3.713	4.2	9917	3.863	3.713	4.8
0.00001	0.00002	1469	3.606	3.456	4.3	10404	3.606	3.456	4.9
	0.00003	1241	3.472	3.322	4.3	8133	3.472	3.322	4.8
	0.00004	1014	3.374	3.224	4.3	6314	3.374	3.224	4.8
	0.00005	786	3.297	3.147	4.2	4777	3.297	3.147	4.8

Table 2: SSQSVSS-3 with known and unknown σ indexed by SSAQL and SSAOQL

SSAQL	SSAOQL	n_σ	$k_{T\sigma}$	$k_{N\sigma}$	σ - Level	n_s	k_{Ts}	k_{Ns}	σ - Level
0.000001	0.000002	1962	4.449	4.331	4.4	22910	4.449	4.331	5.1
	0.000003	1418	4.218	4.068	4.1	15082	4.218	4.068	4.8
	0.000004	874	4.134	3.984	4.0	8977	4.134	3.984	4.8
	0.000005	806	4.068	3.918	4.0	8051	4.068	3.918	4.8
	0.000006	742	4.013	3.863	4.0	7240	4.013	3.863	4.7
	0.000007	674	3.966	3.816	4.0	6444	3.966	3.816	4.7
	0.000008	609	3.950	3.800	4.0	5781	3.950	3.800	4.7
	0.000009	540	3.889	3.739	4.0	4992	3.889	3.739	4.7
0.000002	0.000003	2540	4.209	4.059	4.7	26467	4.209	4.059	5.3
	0.000004	1192	4.125	3.975	4.3	11988	4.125	3.975	4.9
	0.000005	1307	4.059	3.909	4.1	12784	4.059	3.909	4.8
	0.000006	1212	4.004	3.854	4.1	11575	4.004	3.854	4.8
	0.000007	1102	3.957	3.807	4.1	10310	3.957	3.807	4.8
	0.000008	994	3.941	3.791	4.1	9134	3.941	3.791	4.8
	0.000009	890	3.880	3.730	4.1	8046	3.880	3.730	4.8
0.000005	0.000006	2091	3.969	3.819	4.5	17243	3.969	3.819	5.1
	0.000007	1730	3.922	3.772	4.4	13958	3.922	3.772	5.0
	0.000008	1562	3.906	3.756	4.3	12362	3.906	3.756	4.9
	0.000009	1519	3.845	3.695	4.2	11821	3.845	3.695	4.8
0.00001	0.00002	1454	3.573	3.423	4.3	10298	3.573	3.423	4.9
	0.00003	1225	3.438	3.288	4.3	8028	3.438	3.288	4.8
	0.00004	997	3.340	3.190	4.3	6208	3.340	3.190	4.8
	0.00005	765	3.263	3.113	4.2	4649	3.263	3.113	4.8
	0.00006	536	3.199	3.049	4.2	3096	3.200	3.050	4.8
	0.00007	307	3.144	2.994	4.2	1721	3.144	2.994	4.7
	0.00008	76	3.096	2.946	4.2	397	3.098	2.948	4.7
	0.00009	42	2.926	2.776	4.2	214	2.929	2.779	4.7
0.00005	0.00006	933	3.196	3.046	4.5	4778	3.196	3.046	4.9
	0.00007	545	3.140	2.990	4.5	2704	3.141	2.991	4.9
	0.00008	156	3.092	2.942	4.4	755	3.093	2.943	4.9
	0.00009	91	2.922	2.772	4.3	429	2.924	2.774	4.8
	0.0001	68	2.740	2.590	4.3	314	2.742	2.592	4.8
	0.0002	44	2.475	2.325	4.3	173	2.479	2.329	4.7

Table 3: SSQSVSS-2 known σ plans of $P_a(p_m)$ Values

SSAOQL	**SSAQL**						
	0.000001	0.000002	0.000003	0.000004	0.000005	0.00001	0.00005
0.000002	0.94						
0.000003	0.93	0.95					
0.000004	0.91	0.93	0.94				
0.000005	0.84	0.92	0.92	0.94			
0.000006	0.73	0.85	0.85	0.87	0.89		
0.000007	0.49	0.73	0.74	0.75	0.78		
0.000008	0.48	0.50	0.51	0.52	0.54		
0.000009	0.44	0.48	0.49	0.50	0.52		
0.00001	0.42	0.45	0.46	0.47	0.49		
0.00002	0.38	0.43	0.44	0.45	0.47	0.64	
0.00003	0.34	0.38	0.39	0.40	0.42	0.60	
0.00004	0.31	0.35	0.36	0.37	0.39	0.57	
0.00005	0.20	0.32	0.33	0.34	0.36	0.54	
0.00006	0.16	0.21	0.22	0.23	0.25	0.43	0.67
0.00007	0.15	0.17	0.19	0.19	0.22	0.40	0.59
0.00008	0.13	0.14	0.17	0.17	0.20	0.38	0.57
0.00009		0.14	0.15	0.16	0.19	0.37	0.56
0.0001			0.14	0.15	0.17	0.35	0.54
0.0002				0.14	0.16	0.34	0.53
0.0003					0.14	0.32	0.51
0.0004						0.27	0.46
0.0005							0.36

Table 4: SSQSVSS-3 known σ plans of $P_a(p_m)$ Values

SSAOQL	**SSAQL**						
	0.000001	0.000002	0.000003	0.000004	0.000005	0.00001	0.00005
0.000002	0.93						
0.000003	0.91	0.93					
0.000004	0.89	0.92	0.93				
0.000005	0.83	0.90	0.91	0.92			
0.000006	0.71	0.83	0.84	0.85	0.87		
0.000007	0.48	0.72	0.73	0.74	0.76		
0.000008	0.46	0.48	0.49	0.50	0.53		
0.000009	0.43	0.47	0.48	0.49	0.51		
0.00001	0.41	0.43	0.44	0.45	0.48		
0.00002	0.36	0.41	0.42	0.43	0.45	0.63	
0.00003	0.33	0.37	0.37	0.39	0.41	0.58	
0.00004	0.30	0.33	0.34	0.36	0.38	0.55	
0.00005	0.19	0.31	0.31	0.33	0.35	0.52	
0.00006	0.15	0.19	0.20	0.21	0.24	0.41	0.65
0.00007	0.12	0.15	0.17	0.17	0.20	0.38	0.57
0.00008		0.12	0.15	0.15	0.18	0.36	0.55
0.00009				0.14	0.17	0.35	0.54
0.0001							0.52
0.0002							0.51