Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 5, Issue, 12, pp.4029-4032, December, 2013

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

ISSN: 0975-833X

RESEARCH ARTICLE

# SELECTION OF THREE STAGE CHAIN SAMPLING PLAN OF TYPE ChSP (0, 1, 2) INDEXED THROUGH MINIMUM ANGLE METHOD

*Haripriya Ramesh, B.

Department of Science and Humanities, Sri Krishna College of Technology, Coimbatore-641042, Tamilnadu, India

ARTICLE INFO

*Article History:*
Received 14th September, 2013
Received in revised form
07th October, 2013
Accepted 11th November, 2013
Published online 25th December, 2013

*Key words:*
Three stage chain sampling,
Minimum Angle Method,
Statistical Quality Control.

ABSTRACT

In this paper provides a procedure for designing the three stage chain sampling plan of type ChSP (0, 1, 2) indexed through minimum angle method. A Table and methods are given for the construction of plans indexed by minimum angle method.



## INTRODUCTION

Statistical Quality Control (SQC) is those aspects of quality control in which statistics are applied, in contrast to the broader scope of quality control which includes many other procedures, such as preventive maintenance, instrument function checks, and performance validation tests. Acceptance sampling is a major field of statistical quality control. It is a methodology dealing with procedures, which help, in making a decision as whether to accept or reject the lot based on the results of inspection of samples. Single sampling plan is a Sampling inspection in which the decision to accept or not to accept a lot is based on the inspection of a single sample of size ‘n’. The usual practice to use single sampling plan with a small sample size and an acceptance number zero to base the decision to accept or reject the lot. Single sampling plan with acceptance number has zero has the following undesirable characteristics.

1. A single defect in the sample calls for rejection of the lots (or for classifying the lot as non-conforming), and
2. The OC curves of all such sampling plans have a uniquely poorer shape, in that the probability of acceptance starts to drop rapidly for the smallest values of percent defective.

Dodge (1955) treats this problem using a procedure, called chain sampling plan (ChSP – 1). These plans make use of the cumulative inspection results from several results, from one or more samples along with the results from the current sample, in making a decision regarding acceptance or rejection of the current lot. The chain sampling plans are applicable for both small and large samples. Dodge and Stephens (1966) extended the concept of chain sampling plans and presented a set of two-stage chain sampling plans based on the concept of ChSP – 1 developed by Dodge (1955). They presented expressions for OC curves of certain two – stage chain sampling plans and made comparison with single and double sampling attributes inspection plans. The three stage chain sampling plan of type ChSP (0, 1, 2) developed by Soundararajan and Raju (1984) is a generalization of Dodge (1955) chain sampling plan ChSP – 1 and Dodge and Stephens (1966) chain sampling plan ChSP – (0, 1). Soundararajan and Raju (1984) gives the structure and operating procedure of generalized three – stage chain sampling plan and expressions for OC curve of certain three – stage plans are also given. ChSP (0, 1, 2) can be used for both small and large samples, but it is particularly useful when samples must necessarily be small (eg., when tests are costlier). The greater generality in the choice of parameters in the ChSP – (0, 1,2) plan allows for greater flexibility in matching these plans to other plans, and allows for improved discrimination between good and bad quality. A more complete discussion of chain sampling plan can be found in Schilling (1982). The three stage chain sampling plan has 7 parameters which are defined below:

n = sample size

$k_1$ = The maximum number of samples over which the cumulation of the defectives take place in the first stage of procedure.

***Corresponding author: Haripriya Ramesh B.** Department of Science and Humanities, Sri Krishna College of Technology, Coimbatore-641042, Tamilnadu, India.*

$k_2$ = The maximum number of samples over which the cumulation of the defectives take place in the second stage of procedure.

$k_3$ = The maximum number of samples over which the cumulation of the defectives take place in the first of procedure.

$c_1$ = The allowable number of defectives in the cumulative results from $k_1$ or fewer sample of n. Thus $c_1$ is an acceptance number for cumulative results. It is the cumulative results criterion (CRC) that must be met by cumulative sampling results during the first stage of of the restart period in order to permit acceptance of a lot.

$c_2$ = The allowable number of defectives in the cumulative results from $k_1+1$ to $k_2$ sample of n. Thus $c_2$ is also an acceptance number for cumulative results and the CRC that must be met by cumulative sampling results during the second stage of the restart period in order to permit acceptance of a lot.

$c_3$ = The allowable number of defectives in the cumulative results from $k_2+1$ to $k_3$ sample of n. Thus $c_3$ is also an acceptance number for cumulative results and the CRC that must be met by cumulative sampling results during the third stage of the restart period in order to permit acceptance of a lot.

When the sample size is not more than one-tenth of the lot size, and when the quality is measured interms of defectives, the OC curve can be computed using the binomial model. In addition to the condition of sample size being not more than one-tenth of the lot size, if the lot quality p (measured interms of defectives) is less than or equal to 0.01, the OC curve can be based on the Poisson model. When the quality is measured in terms of defects, the appropriate model is also the Poisson one. Under the condition for application of the Poisson model the probability of accepting a lot given the proportion non-conforming under the ChSP-(0,1,2) plan with parameters n, $k_1$, $k_2$, $k_3$, $c_1$, $c_2$, and $c_3$ was derived by Raju (1984) as

$$P_a(p)=\frac{\begin{array}{c}P_0+P_1P_0^{k_2-1}+(k_3-k_2-1)P_1^2P_0^{k_3-2}+P_2P_0^{k_3-1}+P_1P_0^{k_1}\left[\frac{1-P_0^{k_2-k_1-1}}{1-P_0}\right]+(k_2-k_1)P_1^2P_0^{k_2-1}+\\ P_1^2P_0^{k_2}\left[\frac{1-(k_3-k_2-1)P_0^{k_3-k_2-2}}{1-P_0}+\frac{P_0\left(1-P_0^{k_3-k_2-2}\right)}{(1-P_0)^2}\right]+P_2P_0^{k_2}\left[\frac{1-P_0^{k_3-k_2-1}}{1-P_0}\right]\end{array}}{\begin{array}{c}1+P_1P_0^{k_1}\left[\frac{1-P_0^{k_2-k_1-1}}{1-P_0}\right]+(k_2-k_1)P_1^2P_0^{k_2-1}+\\ P_1^2P_0^{k_2}\left[\frac{1-(k_3-k_2-1)P_0^{k_3-k_2-2}}{1-P_0}+\frac{P_0\left(1-P_0^{k_3-k_2-2}\right)}{(1-P_0)^2}\right]+P_2P_0^{k_2}\left[\frac{1-P_0^{k_3-k_2-1}}{1-P_0}\right]\end{array}} \quad ----- (1)$$

Where,

$P_0$= Probability of getting exactly zero non- conforming in a sample of size n

$P_1$= Probability of getting exactly one non- conforming in a sample of size n

$P_2$= Probability of getting exactly two non- conforming in a sample of size n

### A Review on Minimum Angle Method

The practical performance of any sampling plan is generally revealed through its operating characteristic curve. When producer and consumer are negotiating for quality limits and designing sampling plans, it is important especially for the minimize the consumer risk. In order to minimize the consumer's risk, the ideal OC curve could be made to pass as closely through (AQL, 1-α) was proposed by Norman Bush (1953) considering the tangent of the angle between the lines joining the points (AQL, 1-α), (AQL, β). Norman Bush *et al.* (1953) have considered two points on the OC curve as (AQL, 1-α) and (IOL, 0.50) for minimize the consumer's risk. But Peach and Littauer (1946) have taken two points on the OC curves as ($p_1$,1-α) and ($p_2$,β) for ideal condition to minimize the consumers risks here another approach with minimization of angle between the lines joining the points (AQL,1- α) , (AQL, β) and (AQL, 1- α) , (LQL, β) was proposed by Singaravelu (1993). Applying this method one can get a better plan which has an OC curve approaching to the ideal OC curve. Govindaraju.K (1990), Soundararajan.V (1981) and many others have studied AQL.

The formula for tanθ is given as

$$\tan\theta = \frac{oppositeside}{adjacentside} \quad \text{--------------------} \ (2)$$

Tangent of angle made by AB and AC is

$$\tan\theta = (p_2-p_1) / (P_a(p_1)-P_a(p_2)) \quad \text{--------------------} \ (3)$$

Where $p_1$ = AQL and $p_2$ = LQL.

This may be expressed as,

$$n\tan\theta = (np_2-np_1) / (1-\alpha-\beta) \quad \text{------------------} \ (4)$$

The smaller value of this tanθ closer is the angle θ approaching zero, and the chord AB approaching AC, the ideal condition through (AQL, 1-α)

Now

$$\theta = \tan^{-1}\{(n\tan\theta/n)\} \quad \text{--------------------} \ (5)$$

Using this formula the minimum angle θ is obtained, for the

### Construction of Tables

The binomial model for the OC curve will be exact in the case of fraction non-conforming. It can be satisfactorily approximated with the Poisson model where p is small, n is large, and np < 5 when the quality is measured in terms of non conformities, the Poisson model is the appropriate one.

Under the Poisson assumption, the expression for

$$P_0= e^{-np},\ P_1= np\, e^{-np},\ P_2= ((np)^2/2)\, e^{-np} \quad \text{--------------------} \ (6)$$

The equation cannot easily solve. The solutions for np for a given $P_a$ have been found by Newton's method of successive approximation and are tabulated in Table 1 for different values of $k_1$, $k_2$, $k_3$.

**Table 1. The parametric values for three stage chain sampling plan of type ChSP (0, 1, 2)**

| | | | $P_a(p)$ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $k_1$ | $k_2$ | $k_3$ | 0.99 | 0.95 | 0.9 | 0.5 | 0.1 | 0.05 | 0.01 |
| 1 | 2 | 3 | 0.10121 | 0.24023 | 0.35012 | 1.09024 | 2.53024 | 3.14024 | 4.65022 |
| 1 | 2 | 5 | 0.20012 | 0.32012 | 0.41998 | 1.12012 | 2.53017 | 3.13996 | 4.65017 |
| 1 | 4 | 5 | 0.06110 | 0.15987 | 0.26010 | 0.98032 | 2.47987 | 3.12018 | 4.64019 |
| 2 | 3 | 4 | 0.07000 | 0.17231 | 0.26012 | 0.88012 | 2.33023 | 3.00123 | 4.60021 |
| 2 | 5 | 10 | 0.08101 | 0.17023 | 0.24987 | 0.83998 | 2.31995 | 3.00101 | 4.60010 |
| 2 | 9 | 10 | 0.04011 | 0.12012 | 0.20112 | 0.82022 | 2.32023 | 2.99989 | 4.59994 |
| 3 | 4 | 5 | 0.06023 | 0.13998 | 0.22112 | 0.78992 | 2.30010 | 2.99015 | 4.56018 |
| 4 | 5 | 6 | 0.05013 | 0.12987 | 0.20210 | 0.74023 | 2.27012 | 2.97900 | 4.52012 |
| 5 | 6 | 7 | 0.04014 | 0.12023 | 0.18799 | 0.72012 | 2.26743 | 2.97600 | 4.48021 |
| 6 | 7 | 8 | 0.03891 | 0.11023 | 0.17112 | 0.70023 | 2.26499 | 2.96994 | 4.44001 |
| 7 | 8 | 9 | 0.03782 | 0.10112 | 0.15865 | 0.69998 | 2.26233 | 2.96600 | 4.40101 |
| 8 | 9 | 10 | 0.03670 | 0.09850 | 0.15121 | 0.69023 | 2.25983 | 2.96150 | 4.36010 |
| 9 | 10 | 11 | 0.03560 | 0.09015 | 0.15023 | 0.69017 | 2.25733 | 2.95700 | 4.31987 |
| 9 | 10 | 20 | 0.05000 | 0.11000 | 0.16012 | 0.69010 | 2.30021 | 2.99012 | 4.59878 |
| 10 | 11 | 12 | 0.03450 | 0.08860 | 0.13987 | 0.67897 | 2.25483 | 2.95250 | 4.28021 |
| 11 | 12 | 13 | 0.03340 | 0.08720 | 0.14013 | 0.67198 | 2.25233 | 2.94800 | 4.24013 |
| 11 | 12 | 19 | 0.04001 | 0.10112 | 0.14986 | 0.68997 | 2.29987 | 2.99031 | 4.60010 |
| 11 | 17 | 20 | 0.03012 | 0.08012 | 0.14013 | 0.69023 | 2.29981 | 2.99022 | 4.60005 |
| 12 | 13 | 14 | 0.03230 | 0.08580 | 0.13023 | 0.66521 | 2.24983 | 2.94329 | 4.19998 |
| 13 | 14 | 15 | 0.03120 | 0.07852 | 0.13012 | 0.65818 | 2.24733 | 2.93871 | 4.16019 |
| 13 | 14 | 19 | 0.03011 | 0.08788 | 0.14010 | 0.68987 | 2.30019 | 2.99014 | 4.60023 |
| 13 | 14 | 22 | 0.03013 | 0.09012 | 0.14008 | 0.68861 | 2.30011 | 2.99008 | 4.60015 |
| 13 | 17 | 22 | 0.03132 | 0.08123 | 0.13028 | 0.68798 | 2.29989 | 2.99002 | 4.59987 |
| 13 | 20 | 22 | 0.02013 | 0.07945 | 0.13025 | 0.68775 | 2.24531 | 2.98997 | 4.59975 |
| 14 | 15 | 16 | 0.03012 | 0.07850 | 0.13018 | 0.65123 | 2.24483 | 2.93414 | 4.12021 |
| 14 | 15 | 19 | 0.03011 | 0.07980 | 0.13010 | 0.68995 | 2.30024 | 2.98995 | 4.60022 |
| 14 | 15 | 22 | 0.03014 | 0.08760 | 0.14021 | 0.69023 | 2.30018 | 2.98985 | 4.60017 |
| 14 | 17 | 22 | 0.03001 | 0.08010 | 0.13007 | 0.69018 | 2.30010 | 2.98976 | 4.60011 |
| 15 | 16 | 17 | 0.02980 | 0.07700 | 0.13002 | 0.64414 | 2.24233 | 2.92957 | 4.08012 |
| 15 | 18 | 19 | 0.02314 | 0.08001 | 0.12998 | 0.69010 | 2.30012 | 2.99002 | 4.60010 |
| 15 | 18 | 22 | 0.03021 | 0.08012 | 0.12987 | 0.69005 | 2.30232 | 2.98995 | 4.60002 |
| 15 | 20 | 22 | 0.02021 | 0.08032 | 0.12895 | 0.68995 | 2.30422 | 2.98965 | 4.59998 |
| 16 | 17 | 18 | 0.02897 | 0.07550 | 0.12021 | 0.63743 | 2.23983 | 2.92500 | 4.04017 |
| 16 | 18 | 20 | 0.02100 | 0.08012 | 0.12015 | 0.69022 | 2.30012 | 2.98997 | 4.60021 |
| 16 | 19 | 22 | 0.02300 | 0.08000 | 0.12992 | 0.69019 | 2.30200 | 2.98700 | 4.60201 |
| 16 | 21 | 22 | 0.02400 | 0.07000 | 0.12013 | 0.69015 | 2.30400 | 2.98400 | 4.60412 |
| 17 | 18 | 19 | 0.02827 | 0.07400 | 0.12010 | 0.63021 | 2.23733 | 2.92043 | 4.00012 |
| 18 | 19 | 20 | 0.02757 | 0.07250 | 0.12005 | 0.62301 | 2.23483 | 2.91586 | 3.96010 |
| 19 | 20 | 21 | 0.02687 | 0.07100 | 0.12001 | 0.61643 | 2.23233 | 2.91129 | 3.92020 |
| 19 | 20 | 22 | 0.02617 | 0.06950 | 0.11999 | 0.60899 | 2.22983 | 2.90671 | 3.88013 |
| 19 | 21 | 22 | 0.02547 | 0.06800 | 0.11986 | 0.60197 | 2.22733 | 2.90214 | 3.84023 |
| 20 | 21 | 22 | 0.02477 | 0.06650 | 0.11977 | 0.59500 | 2.22483 | 2.89757 | 3.80010 |

**Table 2. Certain characteristic values for three stage chain sampling plan through minimum angle method**

| $k_1$ | $k_2$ | $k_3$ | $np_1$ | $np_2$ | $P_a(p_1)$ | $P_a(p_2)$ | $N\tan\theta$ |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 0.2402 | 2.5302 | 0.9505 | 0.1002 | 45.1946 |
| 1 | 2 | 5 | 0.3201 | 2.5302 | 0.9514 | 0.1005 | 42.582 |
| 1 | 4 | 5 | 0.1599 | 2.4799 | 0.9539 | 0.1009 | 42.3628 |
| 2 | 3 | 4 | 0.1723 | 2.3302 | 0.9526 | 0.1001 | 40.9229 |
| 2 | 5 | 10 | 0.1702 | 2.3200 | 0.9530 | 0.1005 | 40.1859 |
| 2 | 9 | 10 | 0.1201 | 2.3202 | 0.9502 | 0.1004 | 43.4549 |
| 3 | 4 | 5 | 0.1400 | 2.3001 | 0.9546 | 0.1006 | 39.1305 |
| 4 | 5 | 6 | 0.1299 | 2.2701 | 0.9503 | 0.1033 | 39.9000 |
| 5 | 6 | 7 | 0.1202 | 2.2674 | 0.9486 | 0.1036 | 41.1536 |
| 6 | 7 | 8 | 0.1102 | 2.265 | 0.9494 | 0.1038 | 40.5141 |
| 7 | 8 | 9 | 0.1011 | 2.2623 | 0.9511 | 0.1041 | 39.1367 |
| 8 | 9 | 10 | 0.0985 | 2.2598 | 0.9488 | 0.1044 | 40.6628 |
| 9 | 10 | 11 | 0.0902 | 2.2573 | 0.952 | 0.1046 | 38.2402 |
| 9 | 10 | 20 | 0.1100 | 2.3002 | 0.9495 | 0.1002 | 44.0167 |
| 10 | 11 | 12 | 0.0886 | 2.2548 | 0.9501 | 0.1049 | 39.3672 |
| 11 | 12 | 13 | 0.0872 | 2.2523 | 0.9485 | 0.1052 | 40.3775 |
| 11 | 12 | 19 | 0.1011 | 2.2999 | 0.9457 | 0.1003 | 47.8635 |
| 11 | 17 | 20 | 0.0801 | 2.2998 | 0.9534 | 0.1003 | 41.3271 |
| 12 | 13 | 14 | 0.0858 | 2.2498 | 0.9471 | 0.1054 | 41.1857 |
| 13 | 14 | 15 | 0.0785 | 2.2473 | 0.9517 | 0.1057 | 37.8095 |
| 13 | 14 | 19 | 0.0879 | 2.3002 | 0.9489 | 0.1002 | 45.0188 |
| 13 | 14 | 22 | 0.0901 | 2.3001 | 0.9496 | 0.1002 | 44.2987 |
| 13 | 17 | 22 | 0.0812 | 2.2999 | 0.9517 | 0.1003 | 42.7269 |
| 13 | 20 | 22 | 0.0795 | 2.2453 | 0.9486 | 0.1059 | 39.7342 |

Continue………..

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 14 | 15 | 16 | 0.0785 | 2.2448 | 0.9496 | 0.1059 | 38.9661 |
| 14 | 15 | 19 | 0.0798 | 2.3002 | 0.9527 | 0.1002 | 41.9285 |
| 14 | 15 | 22 | 0.0876 | 2.3002 | 0.9483 | 0.1002 | 45.5506 |
| 14 | 17 | 22 | 0.0801 | 2.3001 | 0.9515 | 0.1002 | 42.9233 |
| 15 | 16 | 17 | 0.0770 | 2.2423 | 0.9492 | 0.1062 | 39.0543 |
| 15 | 18 | 19 | 0.0800 | 2.3001 | 0.9453 | 0.1002 | 48.7132 |
| 15 | 18 | 22 | 0.0801 | 2.3023 | 0.9485 | 0.1000 | 45.7842 |
| 15 | 20 | 22 | 0.0803 | 2.3042 | 0.9453 | 0.0998 | 49.2973 |
| 16 | 17 | 18 | 0.0755 | 2.2398 | 0.949 | 0.1065 | 39.0098 |
| 16 | 18 | 20 | 0.0801 | 2.3001 | 0.9452 | 0.1002 | 48.845 |
| 16 | 19 | 22 | 0.0800 | 2.302 | 0.9458 | 0.1001 | 48.4046 |
| 16 | 21 | 22 | 0.0700 | 2.304 | 0.9529 | 0.0999 | 42.3553 |
| 17 | 18 | 19 | 0.0740 | 2.2373 | 0.9489 | 0.1067 | 38.8482 |
| 18 | 19 | 20 | 0.0725 | 2.2348 | 0.949 | 0.1070 | 38.5851 |
| 19 | 20 | 21 | 0.0710 | 2.2323 | 0.9492 | 0.1073 | 38.2355 |
| 19 | 20 | 22 | 0.0695 | 2.2298 | 0.9518 | 0.1075 | 36.3881 |
| 19 | 21 | 22 | 0.0680 | 2.2273 | 0.9520 | 0.1078 | 36.0871 |
| 20 | 21 | 22 | 0.0665 | 2.2248 | 0.9527 | 0.1081 | 35.5191 |

1) Using $np_1$ and $np_2$ values from Table 1 the values of $P_0$, $P_1$ and $P_2$ are calculated
2) Then set $k_1$, $k_2$, $k_3$ values
3) Compute $P_a(p_1)$ and $P_a(p_2)$ , using Equations (1) and (5)
4) Next substituting $np_1$, $np_2$ and $P_a(p_1)$, $P_a(p_2)$ values in the below equation the ntanθ values are calculated as follows, $n\tan\theta = (np_2-np_1) / (P_a(p_1)-P_a(p_2))$
5) Then Record minimum ntanθ value. (tanθ values are given in Table 2)

**Example**

1. Given $p_1 = 0.07$ and $p_2 = 2.24$, then OR = $p_2/p_1 = 2.24/0.07 = 32$. The Associated sets of values corresponding to the computed OR values from Table 2 is, $k_1=19$, $k_2=20$, $k_3=22$, $np_1 = 0.0695$, $np_2 = 2.22983$ and $n\tan\theta = 36.3881$

from the above results, one can find,

$n = np_1/p_1 = 0.0695/0.07 = 0.9929$

$\theta = \tan^{-1}\{(n\tan\theta/n)\}$

$\theta = \tan^{-1}\{(36.3881)/ 0.9929\} = 0.9999$

Now the minimum angle is $\theta = 0.9999$. Hence the selected parameters for the three stage chain sampling plan of type ChSP (0, 1, 2) for given $p_1= 0.07$ and $p_2 = 2.24$ with minimum angle $\theta = 0.9999$.

**Conclusion**

Acceptance sampling is the technique which deals with the procedures in which decision either to accept or reject lots or process which are based on the examination of samples. The work presented in this paper relates to the new procedure for the construction and selection of tables for designing sampling inspection plan through Minimum Angle Method. This procedure reduces the cost of inspection for the producer and the consumer, gets good items. In practice it is desirable to design any sampling plan with the associated quality levels which concern to producer and consumer. Tables provided in this paper are tailor – made which are handy and readymade, which are also well considered for comparison purposes. Tables are also useful for developing and under developing countries, which have limited resources to the Industrial shop floor- situations.

## REFERENCES

Dodge, H.F. 1955. Chain Sampling Inspection Plan, Industrial Quality control, Vol.11, No.4, pp.10-13. (*Also in Journal of Quality Technology*, Vol.9, No.3, July 1977, pp.139-142).

Dodge, H.F. and Stephens, K.S. 1965a, 1966a. Some New Chain Sampling Inspection Plans, Annual Technical Conference Transaction, American Society for Quality Control, Milwaukee, May 1965, pp. 8-17; and Industrial Quality Control, Vol. 23, No. 2, August 1966, pp. 65-67.

Govindaraju, K. 1990. Selection of ChSP-1 chain sampling plans for given Acceptable Quality Level and Limiting Quality Level, Communication in Statistics-Theory methods, vol.19, No.6, pp.2179-2190.

Raju, C. 1984. Contribution to the study of Chain Sampling Plans, Ph.D. Thesis, Bharathiar University, Tamil Nadu, India.

Schilling, E.G. 1982. Acceptance Sampling in Quality Control, Marcel Dekker, Inc., New York.

Soundararajan, V. 1981. Single Sampling Attributes Plan Indexed by AQL and AOQL, Journal of Quality Technology, Vol.13, No.3, pp.195-200.

Norman Bush. et al 1953. A Method of discrimination for single and double sampling OC curves utilizing tangent of point inflection. EN-SAR Report NO.P.R.-7 Engineering Agency.

Peach, P., Littauer, S.B 1946. A Note on Sampling Inspection. Annals of Mathematical Sciences 17, 81-85.

Singaravelu, N., 1993. Contribution to the Study of Certain Acceptance Sampling Plans, Ph.D. Thesis, Bharathiar University, Coimbatore, Tamilnadu, India.

*******