International Journal of Scientific Research in Mathematical and Statistical Sciences
Research Paper
Volume-5, Issue-4, pp.109-117, August (2018)
E-ISSN: 2348-4519

Design and Evaluation of Skiplot Sampling Plans under Life Tests Based on Percentiles of Exponentiated Rayleigh Distribution

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Available online at: www.isroset.org

Accepted: 17/Aug/2018, Online: 30/Aug/2018

Abstract- This paper presents a designing procedure of Skip lot sampling plan of type SkSP-2 with SSP and DSP for the life tests based on the percentiles of Exponentiated Rayleigh Distribution (ERD) as reference plan. This work also provides a comparative study on SkSP-2 with SSP and DSP for life tests based on the percentiles of ERD as reference plan over SSP and DSP for life tests based on the percentiles of ERD as reference plan respectively. The operating characteristic values of the plan are tabulated and the curve is drawn. Illustrations are given for the better understanding of the plan.

Keywords: *Exponentiated Rayleigh Distribution, percentiles, life tests, SSP, DSP, SkSP-2.*

1. Introduction

H.F. Dodge and H.G. Romig developed acceptance sampling techniques during 1929 at Bell Laboratories for inspecting the finished products. The finished products are accumulated into lots or batches and decisions made based on the inspection outcome. This inspection can be done in three ways such as (i) accept with no inspection, (ii) 100% inspection and (iii) acceptance sampling for taking decision about each lots. Acceptance with no inspection is applied to the industries with long history of producing well conformed goods every time but it doesn't guarantee every time. On other hand, 100% inspection is impossible for destructive products or time and cost involved in inspection is very high. Thus to overcome these hitches, many industries widely uses acceptance sampling techniques to decide about the quality standards of the lots. According to ISO-2859.0, 1995, AS is a method portrayed by the sample size and acceptance number, the primary attempt being the planning of a suitable sampling plan to receive a greater precision of the product inspected and to dilute the inspection cost. Also, Schilling (1982) has explained that a good sampling plan must defend the producer as well, in the sense that lots produced at permissible levels of quality will have a good chance to be accepted by the plan. In order to reduce the inspection cost it is very much important to have minimum sample size at required quality levels. To condense the use of larger sample sizes it is sensible to use the acceptance sampling techniques at the earlier stages, which should balance the effects on producer and consumer. Sampling plan used in this work is skip-lot sampling plan of type SkSP-2 with SSP and DSP for life tests based on percentiles of ERD as reference plans.

1.1 Skip-Lot Sampling Plan

Dodge (1955) introduced Skip-lot sampling plan of type SkSP-1 by following the principles of continuous sampling plan of type CSP-1 for lots produced in a continuous fashion. SkSP-1 is a sampling system in which provision is made to skip fraction of lots. Further Dodge and Perry (1971) extended the concept of SkSP-1 and developed a plan of type SkSP-2. SkSP-1 provides go-no-go based decisions but SkSP-2 uses standard reference plans for inspecting individual lots. In this thesis SkSP-2 is developed with single sampling plan and double sampling plan for life tests based on percentiles of ERD as reference plan. SkSP-2 is characterized by two parameters such as clearance interval 'i' and sampling frequency 'f'. The operating procedure for SkSP-2 is as follows,

Step 1: Inspect every lot submitted for inspection using reference plan.

Step 2: When i consecutive lots are accepted, switch to skipping inspection, inspecting a fraction f of the lots at random.

Step 3: If a lot is rejected in step 2 revert to normal inspection as said in step 1.

Step 4: Screen the rejected lot; replace all defective items by non-defective items.

The working principle of SkSP-2 can also be described in a flow chart as presented in Figure 1.

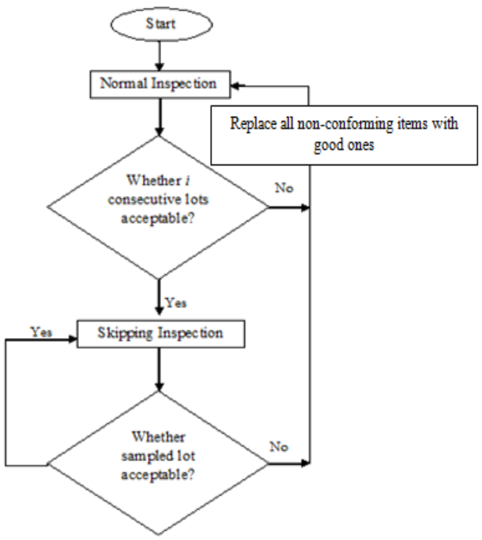

Figure1. Flow chart for operating procedure of SkSP-2 plan

2. Designing of Skip lot sampling plan of type SkSP-2 with SSP for life test based on the percentile of ERD as reference plan

Skip lot sampling plan of type SkSP-2 developed by Dodge and Perry (1971) and Perry (1973a) has the provision to skip few lots when the quality standards of the submitted products are good. This plan uses the basic attribute lot-by-lot acceptance sampling plans to inspect the individual lots, which is called as reference plan.

Perry (1973a) indicated that the attributes plans such as single sampling, double sampling and multiple sampling plans can be used as the reference plans under SkSP-2 and assessed the properties of SkSP-2 with SSP as reference plan. The primary objective of this section is to design SkSP-2 with single sampling plan for life tests based on percentiles of ERD as reference plan.

SkSP-2 with SSP for life tests based on percentiles of ERD as reference plan is operated according to the procedure illuminated in section 1.1 by integrating the operating procedure of SSP for life tests based on the percentiles of ERD to sentence the lots at each stage. SSP for life tests based on the percentiles of ERD is depicted by sample size *n*, acceptance number *c* and failure probability *p* where $p = F(t, \delta_0)$. Its operating procedure is as follows,

Step 1: Draw a random sample of size *n* and put on test for time t_0.

Step 2: Find the number of defectives d and compare it with the acceptance number c.

i. If $d > c$, reject the lot.

ii. If $d \leq c$, accept the lot.

Step 3: If $d > c$, is obtained before time t_0, terminate the test and reject the lot.

2.1 Formation of the Sampling Plan

While forming a sampling plan the parameters are selected in a way that the consumers and producers must feel satisfied. This can be done by applying two point approach on the OC curve ARL(p_0) and LRL(p_1) such that $L(p_0)=1-\alpha$ and $L(p_0)=\beta$. While in life testing the procedure is to terminate the test at a pre-determined time t.

The probability of bad lot to be rejected is *P** and the maximum number of defectives allowed is *c*. Now, the acceptance single sampling plan for percentiles based on the truncated life test is to set up the minimum sample size *n* for the specified acceptance number *c* such that the probability of accepting the bad lot that is the consumer's risk does not exceed *1-P**is implemented in the skip lot sampling plan of type SkSP-2. A bad lot means that the true $100q^{th}$ percentile t_q is below the specified percentile t_q^0. Hence, the probability *P** is a confidence level in the sense that the chance of rejecting a bad lot with $t_q < t_q^0$ is at least equal to *P**. The operating procedure of the proposed plan is as follows:

Step 1: Set $\theta = 2$ and compute the value of η for the required percentile (10^{th}) from equation,

$$\eta = \sqrt{-2\ln(1-q^{\frac{1}{\theta}})} \qquad (*)$$

Step 2: Fix the value of *i*, *f* randomly, required *P**and the acceptance number *c*.

Step 3: Accordingly select the value of smallest sample size *n* from Table 1of Pradeepa Veerakumari (2016).

Now the value of *P* for SkSP-2 is evaluated from the OC function of SSP for life tests based on the percentiles of ERD. Hence SkSP-2 with SSP for life test based on the percentiles of ERD as reference plan is in general specified by SSP for life tests based on the percentiles of ERD, clearing interval *i* and sampling frequency *f*.

2.2 Operating characteristic function

The OC function is one of the most useful performance measures to access the effectiveness of any sampling plan. It gives the probability that the lot can be accepted. The OC function of SSP for life tests based on the percentiles of ERD is given by,

$$L(p) = \sum_{i=0}^{c} \binom{n}{i} p^i (1-p)^{n-i} \qquad (1)$$

Where $p = F(t, \delta_0)$ is the failure probability at time *t* given a specified 100q[th] percentile of lifetime t_q^0 and *p* depends only on $\delta_0 = t/t_q^0$. The OC values are tabulated in Table 3 of Pradeepa Veerakumari (2016).

The OC and ASN function of SkSP-2 for the lot quality *p* are given by,

$$L(p) = \frac{fP + (1-f)P^i}{f + (1-f)P^i} \qquad (2)$$

$$ASN(p) = ASN(R)F \qquad (3)$$

where ASN(*R*) is the average sample number function of the reference plan, *P* is the probability of acceptance corresponding to the reference plan and *F* is the average fraction of total lots that are inspected and is given by the following relationship,

$$F = \frac{f}{f + (1-f)P^i} \qquad (4)$$

Now, the OC and ASN function of skip lot sampling plan of type SkSP-2 with SSP for life tests based on the percentiles of ERD as reference plan are defined as in (2) and (3), and ASN(*R*) for SSP is its sample size *n* itself.

Example 1

To fit the Skip lot sampling plan of type SkSP-2 with SSP for life tests based on percentiles of ERD as reference plan with θ=2, $t = 40hrs$, $t_{0.1} = 20hrs$, *c*=2, α=0.05and β=0.10 then η=0.871929 from the equation * and the ratio is found to be $t/t_{0.1} = 2.00$. From Table 1of Pradeepa Veerakumari (2016).the minimum sample size suitable for the given information is found to be as $n = 7$. And the respective operating characteristic values $L(p)$ for the Single Sampling plan for the life tests based on percentiles of ERD $(n, c, t/t_{0.1}) = (7,2,2)$ with $P^* = 0.90$ under ERD from Table 3 of Pradeepa Veerakumari (2016).are,

$t_{0.1}/t_{0.1}^0$	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
$L(p)$	0.0003	0.0601	0.3844	0.7281	0.9013	0.9662	0.9883	0.9958	0.9984

L(*p*) is the *P* value for SkSP-2 with SSP for life tests based on the percentiles of ERD as reference plan. For *i=4* and *f=1/3*, the probability of acceptance *L*(*p*) values of SkSP-2 with SSP for life tests based on percentiles of ERD are found from eqn. 2 as,

$t_{0.1}/t_{0.1}^0$	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
$L(p)$	0.0865	0.4898	0.8686	0.9682	0.9908	0.9970	0.9990	0.9996	0.9998

This shows that if the actual 10[th] percentile is equal to the required 10[th] percentile $(t_{0.1}/t_{0.1}^0 = 1.00)$ the producer's risk is approximately 0.9135 (1- 0.0865). The producer's risk is almost equal to 0.05 or less when the actual 10[th] percentile is greater than or approximately equal to 1.75 times the specified 10[th] percentile. The OC curve for the illustration is given in the figure 2.

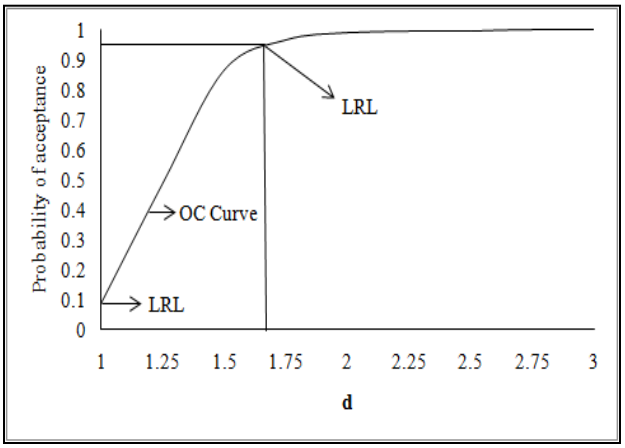

Figure 2. OC Curve for i=4, f=1/3, $P^*=0.90$, $d=d_{0.1}$ and θ=2

The figure 2 clearly says that the plan attains ARL when the actual life time percentile is in close proximity to 1.75 times greater than the specified 10^{th} percentile and attains LRL when the actual life time percentile is approximately equal to the specified life time percentile.

For convenience, the table for OC values is constructed and tabulated with $i=4$, $f=1/3$ and $c=2$ in Table 1.

3. Designing of Skip lot sampling plan of type SkSP-2with DSP for life test based on the percentile of ERD as reference plan

The primary objective of this section is to design Skip lot sampling plan of type SkSP-2 with double sampling plan for life tests based on percentiles of ERD as reference plan.SkSP-2 with DSP for life tests based on percentiles of ERD as reference plan is operated according to the procedure illuminated in section 1.1 by integrating the operating procedure of DSP for life tests based on the percentiles of ERD to sentence the lots at each stage. DSP for life tests based on the percentiles of ERD is depicted by sample sizes n_1 and n_2, acceptance number c_1 and c_2 and failure probability p where $p = F(t, \delta_0)$. Its operating procedure is as follows,

Step 1: Select the first random sample of size n_1 from the lot and put them on test for time t_0 under normal inspection and count the number of defectives d_1 and compare it with the acceptance number under normal inspection.

Step 2: If $d_1 \le c_1$, accept the lot.

Step 3: If $d_1 > c_2$, reject the lot.

Step 4: If $d_1 > c_2$ is obtained before time t_0, terminate the test and reject the lot.

Step 5: If $c_1 < d_1 \le r_1$, take a second sample of size n_2 from the remaining lot and put them on test for time t_0 and count the number of non-conformities (d_2).

Step 6: If $d_1+d_2 \le r_1$, accept the lot.

Step 7: If $d_1+d_2 > r_1$, reject the lot.

3.1 Formation of the Sampling Plan

While forming a sampling plan the parameters are selected in a way that the consumers and producers must feel satisfied. This can be done by applying two point approach on the OC curve ARL(p_0) and LRL(p_1) such that $L(p_0)=1-\alpha$ and $L(p_1)=\beta$. While in life testing the procedure is to terminate the test at a pre-determined time t. The probability of bad lot to be rejected is P^* and the maximum number of defectives allowed is c. Now, the acceptance double sampling plan for truncated life test based on the percentiles is to set up the minimum sample sizes n_1 and n_2 for the specified acceptance number c_1 and c_2 such that the probability of accepting the bad lot that is the consumer's risk does not exceed $1-P^*$ is implemented in the skip lot sampling plan of type SkSP-2. A bad lot means that the true $100q^{th}$ percentile t_q is below the specified percentile t_q^0. Hence, the probability P^* is a confidence level in the sense that the chance of rejecting a bad lot with $t_q < t_q^0$ is at least equal to P^*. The operating procedure of the proposed plans as follows:

Step 1: Set $\theta = 2$ and compute the value of η for the required percentile (10^{th}) from eqn. 3.

Step 2: Fix the value of i, f randomly, required P^* and the acceptance number $c_1=0$ and $c_2=2$.

Step 3: Accordingly select the value of smallest sample sizes n_1 and n_2 from the Table 1of Pradeepa Veerakumari (2017).

Now the value of P for SkSP-2 is evaluated from the OC function of DSP for life tests based on the percentiles of ERD. Hence SkSP-2 with DSP for life test based on the percentiles of ERD as reference plan is in general specified by DSP for life tests based on the percentiles of ERD, Clearing interval i and sampling frequency f.

3.2 Operating characteristic function

The OC function is one of the most useful performance measures to access the effectiveness of any sampling plan. It gives the probability that the lot can be accepted. The OC function of DSP for life tests based on the percentiles of ERD is given by,

$$L(p)=\sum_{d_1=0}^{c_1}\binom{n_1}{d_1}p^{d_1}(1-p)^{n_1-d_1}+\sum_{d_1=c_1+1}^{c_2}\binom{n_1}{d_1}p^{d_1}(1-p)^{(n_1-d_1)}\cdot\sum_{d_2=0}^{c_2-d_1}\binom{n_2}{d_2}p^{d_2}(1-p)^{n_2-d_2}\leq 1-P^* \quad ...(5)$$

where $p=F(t,\delta_0)$ is the failure probability at time t given a specified 100qth percentile of lifetime t_q^0 and p depends only on $\delta_0=t/t_q^0$. The OC values are tabulated in Table 1of Pradeepa Veerakumari (2017).

The OC and ASN function of SkSP-2 for the lot quality p are given by eqn. 2 and 3 where ASN(R) is the average sample number function of the reference plan, P is the probability of acceptance corresponding to the reference plan and F is the average fraction of total lots that are inspected and is given by eqn. 4 and ASN(R) for DSP is given by the relation,

$$ASN=n_1p_1+(n_1+n_2)(1-p_1)=n_1+n_2(1-p_1) \quad ...(6)$$

Example 2

To fit the Skip lot sampling plan of type SkSP-2 with DSP for life tests based on percentiles of ERD with θ=2, $t=40hrs$, $t_{0.1}=20hrs$, c_1=0, c_2=2, α = 0.05and β=0.10, then η=0.871929 from the equation * and the ratio is found to be $t/t_{0.1}=2.00.$ From Table 1of Pradeepa Veerakumari (2017) the minimum sample size suitable for the given information is found to be as $n_1=3$ and $n_2=5$. And the respective operating characteristic values $L(p)$ for the Double Sampling plan for the life tests based on percentiles of ERD $(n_1,n_2,c_1,c_2,t/t_{0.1})=(3,5,0,2,2)$ with P^* = 0.90 under ERD from Table 1of Pradeepa Veerakumari (2017)are,

$t_{0.1}/t_{0.1}^0$	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
$L(p)$	0.081	0.3873	0.708	0.8806	0.9522	0.9801	0.9912	0.9958	0.9979

$L(p)$ is the P value for SkSP-2 with DSP for life tests based on the percentiles of ERD as reference plan. For i=4 and f=1/3, the probability of acceptance $L(p)$ values ofSkSP-2 with DSP for life tests based on percentiles of ERD are found from eqn. 5.2 as,

$t_{0.1}/t_{0.1}^0$	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
$L(p)$	0.0811	0.4137	0.8057	0.9458	0.9819	0.993	0.997	0.9986	0.9993

This shows that if the actual 10th percentile is equal to the required 10th percentile $(t_{0.1}/t_{0.1}^{\,0}=1.00)$ the producer's risk is approximately 0.9135 (1- 0.0865). The producer's risk is almost equal to 0.05 or less when the actual 10th percentile is greater than or approximately equal to 1.75 times the specified 10th percentile. The OC curve for the illustration is given in the figure 3:

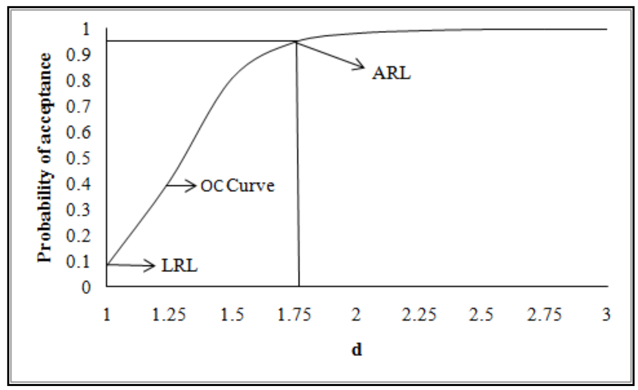

Figure 3. OC Curve for i=4, f=1/3, $P^*=0.90$, $d=d_{0.1}$ and θ=2

The figure 3 clearly says that the plan attains ARL when the actual life time percentile is in close proximity to 1.75 times greater than the specified 10th percentile and attains LRL when the actual life time percentile is approximately equal to the specified life time percentile.

For convenience, the table for OC values is constructed and tabulated with i=4, f=1/3, c_1=0and c_2=2 in table 2.

4. Comparison of SkSP-2 with SSP for life tests based on percentiles of ERD as reference plan over SSP for life test based on percentiles of ERD

The usual method of comparing two plans is by its operating characteristic curves and through its ASN values. Also the performance measures say their respective ARL and LRL are also used to compare the plans. In this section Skip lot sampling plan with SSP for life tests based on percentiles of ERD as reference plan is compared with SSP for life tests based on percentiles of ERD with the following illustration.

Example 3

Suppose θ=2, $t = 40hrs$, $t_{0.1} = 20hrs$, *c*=2, α = 0.05, β=0.10 then,η=0.871929 is calculated from the equation 3.3 and the ratio, $t/t_{0.1} = 2.00$ and from Table 1 of Pradeepa Veerakumari (2016) the minimum sample size suitable for the given information is found to be as $n = 7$. And Table 3 of Pradeepa Veerakumari (2016) gives their respective OC values. With this plan as the reference plan the Skip lot sampling plan of type SkSP-2 is designed and their respective OC values are also tabulated in table 1 with *i=4* and *f=1/3*. The ASN is also found using the relation given in equation 3. For the comparative purpose the values representing the illustration are tabulated in table 3.

The table 3 says that the OC values of SkSP -2 with SSP for life tests based on percentiles of ERD is slightly increased from SSP for life tests based on percentiles of ERD. The ASN values are also shown to be lesser for SkSP-2 with SSP as reference plan comparing to SSP. The curves representing comparison of OC values and ASN values for the defined parameters obtained from the table 3 are given in figure 4 and 5 respectively.

Table 3: OC and ASN values of SSP for life tests based on ERD percentiles and SkSP-2 with SSP for life tests based on ERD percentiles as reference plan

$t_{0.1}/t_{0.1}^{0}$	OC Values		ASN Values	
	SSP ERD Percentiles	**SkSP-2 with SSP ERD Percentiles**	**SSP ERD Percentiles**	**SkSP-2 with SSP ERD Percentiles**
1	0.0864	0.0865	7	7
1.25	0.4485	0.4898	7	6
1.5	0.7742	0.8686	7	4
1.75	0.9223	0.9682	7	3
2	0.9743	0.9908	7	2
2.25	0.9913	0.9970	7	2
2.5	0.9969	0.9990	7	2
2.75	0.9988	0.9996	7	2
3	0.9995	0.9998	7	2

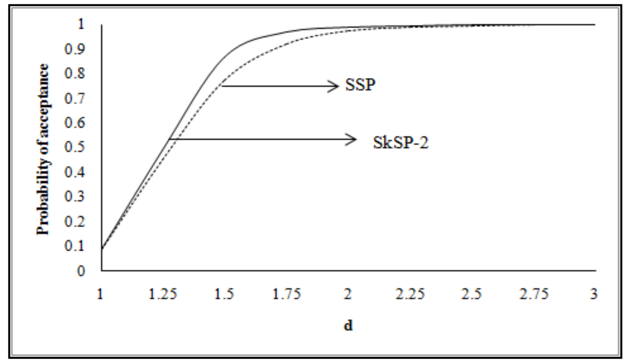

Figure 4. OC Curve of SkSP -2 with SSP for ERD percentiles and SSP for ERD percentiles

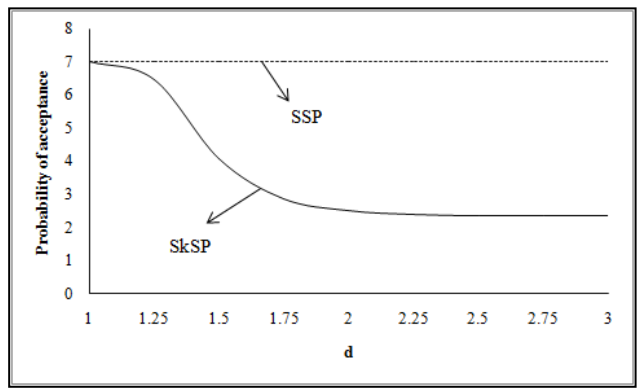

Figure 5. ASN Curve of SkSP -2 with SSP for ERD percentiles and SSP for ERD percentiles

5. Comparison of SkSP-2 with DSP for life tests based on percentiles of ERD as reference plan over DSP for life test based on percentiles of ERD

The usual method of comparing two plans is by its operating characteristic values and through its ASN values. In this section Skip lot sampling plan with DSP for life tests based on percentiles as reference plan is compared with DSP for life tests based on percentiles of ERD with the following illustration. For comprehensible result the curves for the OC values and ASN values are drawn.

Example 4.

Suppose θ=2, $t = 40hrs$, $t_{0.1} = 20hrs$, *c*=2, α=0.05, β=0.10 then, η=0.871929 is calculated from the equation 3.4 and the ratio, $t/t_{0.1} = 2.00$ and from Table 4.1.1 the minimum sample size suitable for the given information is found to be as n_1=3 and n_2=5. And from the Table 1 of

Pradeepa Veerakumari (2017) their respective OC values are also found. With this plan as the reference plan the Skip lot sampling plan of type SkSP-2 is designed and their respective OC values are also tabulated in table 4 with *i=4* and *f=1/3*. The ASN for SkSP-2 with DSP for life tests based on percentiles of ERD as reference plan is also found using the relation given in equation 3 and for DSP for life tests based on the percentiles of ERD is obtained from equation 6. For the comparative purpose the obtained ASN values and the OC values denoting the illustration are found from Table 1 of Pradeepa Veerakumari (2016) and table 2 are reproduced in table 4.

Table 4: OC and ASN values of DSP for life tests based on ERD percentiles and SkSP-2 with DSP for life tests based on ERD percentiles as reference plan

$t_{0.1} / t_{0.1}^{0}$	OC Values		ASN Values	
	DSP ERD Percentiles	**SkSP-2 with DSP ERD Percentiles**	**DSP ERD Percentiles**	**SkSP-2 with DSP ERD Percentiles**
1	0.081	0.081	8	8
1.25	0.387	0.414	6	6
1.5	0.708	0.806	5	3
1.75	0.881	0.946	4	2
2	0.952	0.982	4	2
2.25	0.98	0.993	3	2
2.5	0.991	0.997	3	2
2.75	0.996	0.999	3	2
3	0.998	0.999	3	2

The table 4 says that the OC values of SkSP-2 with DSP for life tests based on percentiles of ERD is slightly increased from DSP for life tests based on percentiles of ERD. The ASN values are also shown to be lesser for SkSP-2 with DSP as reference plan comparing to DSP for life tests based on percentiles of ERD. The curves representing the comparison of OC values for the defined parameters obtained from table 4 are given in figure 6.

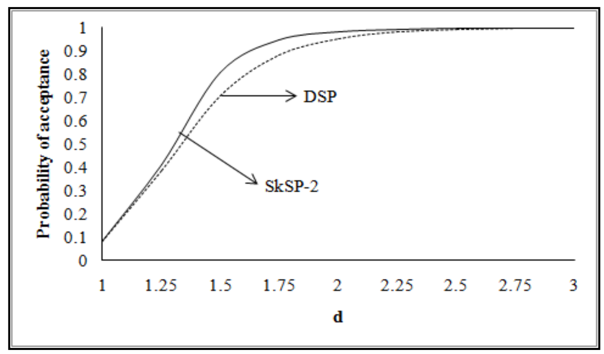

Figure 6 OC Curve of SkSP-2 with DSP for ERD percentiles and DSP for ERD percentiles

Table 1:OC values for SkSP-2 with Single Sampling Plan (n, c=2, $t/t_{0.10}$) as reference plan for a given P^* under ERD when $\theta = 2$

P*	n	t/t_q^0	t_q/t_q^0								
			1.0000	**1.2500**	**1.5000**	**1.7500**	**2.0000**	**2.2500**	**2.5000**	**2.7500**	**3.0000**
0.7500	135.0000	0.7000	0.2547	0.8528	0.9790	0.9959	0.9990	0.9997	0.9999	1.0000	1.0000
0.7500	55.0000	0.9000	0.2540	0.8399	0.9760	0.9951	0.9988	0.9997	0.9999	1.0000	1.0000
0.7500	39.0000	1.0000	0.2427	0.8247	0.9730	0.9944	0.9986	0.9996	0.9999	1.0000	1.0000
0.7500	11.0000	1.5000	0.2454	0.7879	0.9623	0.9914	0.9977	0.9993	0.9998	0.9999	1.0000
0.7500	6.0000	2.0000	0.1661	0.6465	0.9226	0.9810	0.9945	0.9982	0.9994	0.9998	0.9999
0.7500	4.0000	2.5000	0.1477	0.5638	0.8823	0.9685	0.9902	0.9966	0.9988	0.9995	0.9998
0.9000	183.0000	0.7000	0.0994	0.6732	0.9510	0.9904	0.9977	0.9994	0.9998	0.9999	1.0000
0.9000	75.0000	0.9000	0.0957	0.6427	0.9425	0.9885	0.9972	0.9992	0.9998	0.9999	1.0000
0.9000	52.0000	1.0000	0.0968	0.6330	0.9388	0.9876	0.9969	0.9991	0.9997	0.9999	1.0000
0.9000	15.0000	1.5000	0.0829	0.5376	0.9024	0.9785	0.9942	0.9983	0.9994	0.9998	0.9999

0.9000	7.0000	2.0000	0.0865	0.4898	0.8686	0.9682	0.9908	0.9970	0.9990	0.9996	0.9998
0.9000	5.0000	2.5000	0.0419	0.3104	0.7282	0.9255	0.9773	0.9922	0.9971	0.9988	0.9995
0.9500	216.0000	0.7000	0.0498	0.5372	0.9217	0.9850	0.9964	0.9990	0.9997	0.9999	1.0000
0.9500	88.0000	0.9000	0.0486	0.5078	0.9092	0.9821	0.9956	0.9987	0.9996	0.9999	1.0000
0.9500	61.0000	1.0000	0.0491	0.4969	0.9032	0.9806	0.9951	0.9986	0.9996	0.9998	0.9999
0.9500	17.0000	1.5000	0.0465	0.4245	0.8577	0.9690	0.9917	0.9975	0.9992	0.9997	0.9999
0.9500	8.0000	2.0000	0.0436	0.3608	0.7974	0.9509	0.9860	0.9954	0.9984	0.9994	0.9998
0.9500	5.0000	2.5000	0.0419	0.3104	0.7282	0.9255	0.9773	0.9922	0.9971	0.9988	0.9995
0.9900	288.0000	0.7000	0.0100	0.3049	0.8238	0.9669	0.9920	0.9977	0.9993	0.9998	0.9999
0.9900	117.0000	0.9000	0.0097	0.2816	0.7975	0.9606	0.9903	0.9972	0.9991	0.9997	0.9999
0.9900	81.0000	1.0000	0.0098	0.2729	0.7850	0.9572	0.9894	0.9969	0.9990	0.9997	0.9999
0.9900	23.0000	1.5000	0.0073	0.2000	0.6724	0.9243	0.9802	0.9939	0.9979	0.9993	0.9997
0.9900	11.0000	2.0000	0.0048	0.1378	0.5330	0.8642	0.9623	0.9878	0.9957	0.9983	0.9993
0.9900	7.0000	2.5000	0.0027	0.0865	0.3882	0.7613	0.9273	0.9755	0.9908	0.9963	0.9984

Table 2:OC values forSkSP-2 with Double Sampling Plan (n_1, n_2, c_1=0, c_2=2, $t/t_{0.10}$) for a given p^* under ERD when θ = 2

P*	**n1**	**n2**	**t/t_q^0**	**t_q/t_q^0**								
				1	**1.25**	**1.5**	**1.75**	**2**	**2.25**	**2.5**	**2.75**	**3**
0.75	48	208	0.7	0.2565	0.7188	0.9441	0.987	0.9963	0.9988	0.9995	0.9998	0.9999
0.75	20	75	0.9	0.2483	0.7147	0.9425	0.9862	0.996	0.9986	0.9995	0.9998	0.9999
0.75	14	49	1	0.2471	0.7154	0.9421	0.9859	0.9958	0.9986	0.9994	0.9998	0.9999
0.75	4	11	1.5	0.2363	0.6975	0.9328	0.9825	0.9945	0.998	0.9992	0.9996	0.9998
0.75	2	4	2	0.2355	0.6969	0.9275	0.9797	0.9932	0.9974	0.9989	0.9995	0.9998
0.75	2	2	2.5	0.1261	0.4915	0.8285	0.9455	0.9796	0.9913	0.9959	0.998	0.9989
0.75	2	2	3	0.0191	0.1722	0.4915	0.7906	0.9215	0.9673	0.9848	0.9924	0.9959
0.75	2	1	3.5	0.0375	0.1902	0.4504	0.7153	0.8703	0.9389	0.969	0.9832	0.9905
0.75	2	1	4	0.0091	0.0792	0.2474	0.4866	0.7153	0.8569	0.9268	0.9604	0.9774
0.9	79	269	0.7	0.0997	0.4543	0.8528	0.9662	0.9904	0.9968	0.9988	0.9995	0.9998
0.9	32	99	0.9	0.0989	0.4504	0.849	0.9645	0.9897	0.9965	0.9986	0.9994	0.9997
0.9	22	74	1	0.0996	0.4298	0.829	0.959	0.9881	0.9959	0.9984	0.9993	0.9997
0.9	6	16	1.5	0.0941	0.4136	0.8116	0.9516	0.9851	0.9947	0.9979	0.9991	0.9995
0.9	3	5	2	0.0811	0.4137	0.8057	0.9458	0.9819	0.993	0.997	0.9986	0.9993
0.9	2	3	2.5	0.0557	0.3246	0.7176	0.9132	0.9702	0.9882	0.9948	0.9975	0.9987
0.9	2	2	3	0.0191	0.1722	0.4915	0.7906	0.9215	0.9673	0.9848	0.9924	0.9959
0.9	2	2	3.5	0.0017	0.0434	0.2095	0.4915	0.7587	0.897	0.9531	0.9768	0.9876
0.9	2	2	4	0.0001	0.0078	0.0714	0.2397	0.4915	0.7322	0.8729	0.9377	0.9673
0.95	103	262	0.7	0.0495	0.3403	0.7907	0.9519	0.9862	0.9953	0.9982	0.9992	0.9996
0.95	42	91	0.9	0.0485	0.3442	0.7931	0.9512	0.9856	0.9949	0.998	0.9991	0.9996
0.95	29	64	1	0.0486	0.3332	0.7789	0.9469	0.9843	0.9944	0.9978	0.999	0.9995
0.95	8	15	1.5	0.0437	0.3005	0.7311	0.9288	0.9779	0.9919	0.9966	0.9985	0.9992
0.95	4	5	2	0.0344	0.2771	0.6894	0.9076	0.9691	0.9878	0.9946	0.9974	0.9987
0.95	2	4	2.5	0.037	0.2355	0.6088	0.8717	0.9576	0.9839	0.9932	0.9969	0.9985
0.95	2	2	3	0.0191	0.1722	0.4915	0.7906	0.9215	0.9673	0.9848	0.9924	0.9959

0.95	2	2	3.5	0.0017	0.0434	0.2095	0.4915	0.7587	0.897	0.9531	0.9768	0.9876
0.95	2	2	4	0.0001	0.0078	0.0714	0.2397	0.4915	0.7322	0.8729	0.9377	0.9673
0.99	158	237	0.7	0.0101	0.1901	0.6498	0.9133	0.9749	0.9911	0.9964	0.9984	0.9992
0.99	64	92	0.9	0.0099	0.1801	0.6241	0.9024	0.9714	0.9897	0.9958	0.9981	0.9991
0.99	44	66	1	0.0101	0.1713	0.6012	0.893	0.9686	0.9888	0.9954	0.9979	0.999
0.99	12	16	1.5	0.0088	0.1446	0.5251	0.8506	0.9539	0.983	0.9928	0.9967	0.9983
0.99	5	11	2	0.009	0.0967	0.3543	0.7123	0.9049	0.9662	0.9863	0.9939	0.9971
0.99	3	4	2.5	0.0071	0.1057	0.3951	0.7408	0.9096	0.9652	0.9849	0.9928	0.9963
0.99	2	3	3	0.0056	0.0832	0.3246	0.6606	0.8717	0.9501	0.9784	0.9897	0.9948
0.99	2	2	3.5	0.0017	0.0434	0.2095	0.4915	0.7587	0.897	0.9531	0.9768	0.9876
0.99	2	2	4	0.0001	0.0078	0.0714	0.2397	0.4915	0.7322	0.8729	0.9377	0.9673

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