



Group Acceptance Sampling Plans for Life Tests Based on New Rayleigh Pareto Distribution

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ARTICLE INFO	ABSTRACT
Published Online: 19 September 2026	In this paper, we present the development of a Group Acceptance Sampling Plans (GASPs) for the lifetime of an item follow the new Rayleigh-Pareto distribution. We determine the plan parameters, including the minimum group size, g and the acceptance number, c required under specified test termination conditions and consumer's risk. Our analysis demonstrates that the proposed GASP performs existing plans by achieving comparable decisions with smaller sample sizes. The operating characteristic values of the sampling plans and producer's risk are also deliberated. The findings are explained with the help of real data set.
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1. INTRODUCTION

Sampling plans (SP) are methods for evaluating a collection by examining only a portion of it and making inferences with a predetermined confidence level. In quality control, various sampling plans are used, with reliability being a crucial aspect of this analysis. The main objective of these studies is to save time and cost for the experimenter by determining whether to accept or reject a given lot (group) based on inferences. Acceptance Sampling Plans (ASPs) are essential tools for determining the reliability of manufactured articles with respect to their lifetime. While ordinary acceptance sampling plans inspect a single item at a time, Group Acceptance Sampling Plans (GASPs) allow for the examination of several items simultaneously, based on the number of testers available to the experimenter, the lifetime of an article (item) follows the new Rayleigh Pareto distribution with a known shape parameter.

GASPs offer advantageous over traditional sampling plans by significantly reducing testing costs and time. An example of this approach is sudden death testing. In many situations, a submitted lot may not be accepted by the consumer based on a single acceptance sampling plan. The producer can dispute the first sample information, select a

second sample of the same size for inspection, and make an inference discarding the previous results. Recent research has expanded the application of GASPs in various distributions. For instance, GASPs for failure time distributions have been introduced by Aslam and Jun (2009a, 2009b), Rao and Kantam (2010) developed acceptance sampling plans from truncated life tests based on the log-logistic distribution for percentiles. Aslam et al. (2011), proposed time truncated group acceptance sampling plans for generalized exponential distribution. Additionally, studies have examined various distributions for acceptance sampling plans and group acceptance sampling plans. Baklizi (2003), Rosaiah and Kantam (2005) developed acceptance sampling based on the inverse Rayleigh distribution. Tsai and Wu (2006), Mitchell et al. (2011), Rosaiah et al. (2016), Rao et al. (2016, 2019), Al-Omari et al. (2020), Naveen Gupta et al. (2020), Khan and Alquarni (2020), Al-Omari et al. (2021), Rao and Lakshmi (2021), Neena Krishna and Jayalaxmi (2021), Harsh Tripathi et al. (2021), Sridhar Babu et al. (2021), Saha et al. (2021), Srinivasa Rao and Balasuseela (2022) developed a hybrid group acceptance sampling plans for life tests based on the exponentiated inverted Weibull distribution. Jyothi et al.

(2022) developed new acceptance sampling plans for the new Rayleigh Pareto distribución. Ameeq *et al.* (2023), Sivakumar *et al.* (2023), Chinnamamba (2024), Amer Ibrahim Al-Omari and Mohd Tahir Ismail (2024) discussed group acceptance sampling plans based on truncated life tests for gamma Lindley distribution with real data applications. Naveen Gupta *et al.* (2025), Karthik Narayana *et al.* (2026). In this paper, we discussed in Section 2 describes brief introduction of the new Rayleigh Pareto distribution (NRPD), In Section 3, The design of group acceptance sampling plans (GASPs), In Section 4, we presented report of the planed system with real data analysis,

In Section 5, provides comparative study. Finally summary and conclusions are given in Section 6.

2. NEW RAYLEIGH PARETO DISTRIBUTION (NRPD)

In this section, we provide a brief introduction to the New Rayleigh Pareto distribution. The NRPD was introduced and developed by Kareema Abed Al-Kadim and Bnadher Dhea'a Mohammed (2018). The cumulative distribution function (CDF) and probability density function (PDF) of New Rayleigh Pareto distributions are respectively given as follows

$$F(t; \sigma, \lambda, \gamma) = 1 - e^{-\frac{1}{2\sigma^2} \left(\frac{t}{\lambda}\right)^{2\gamma}}, t > 0, \sigma, \lambda, \gamma > 0 \quad (1)$$

$$f(t; \sigma, \lambda, \gamma) = \frac{\gamma}{\sigma^2 \lambda} \left(\frac{t}{\lambda}\right)^{2\gamma-1} e^{-\frac{1}{2\sigma^2} \left(\frac{t}{\lambda}\right)^{2\gamma}}, t > 0, \sigma, \lambda, \gamma > 0 \quad (2)$$

where λ, σ are known as scale parameters and γ is the shape parameter.

The 100_q^{th} quantile of the NRPD as follows

$$t_q = \lambda \eta_q, \text{ where } \eta_q = \left[-\ln(1-q) 2\sigma^2 \right]^{1/2\gamma} \quad (3)$$

therefore, for the permanent values of $\sigma = \sigma_0$ and $\gamma = \gamma_0$ the quantile t_q is given in equation (3) be the role of scale parameter $\lambda = \lambda_0$ to be exact $t_q \geq t_q^0 \Leftrightarrow \lambda \geq \lambda_0$, where

$$\lambda_0 = \frac{t_q^0}{\left[-\ln(1-q) 2\sigma_0^2 \right]^{1/2\gamma_0}} \quad (4)$$

note that λ_0 be the influenced on $\sigma_0 = \gamma_0$, to establish ASPs for the NRPD as certain $t_q \geq t_q^0$ equally that λ beats λ_0 .

3. GROUP ACCEPTANCE SAMPLING PLANS (GASPS)

We introduce a group acceptance sampling plan (GASP), where the life time of the article (item) follows new Rayleigh Pareto distribution (NRPD). The GASP considers the combined effect of both the producer's risk α and the consumer's risk β . Based upon the work of Aslam *et al.* (2010), who proposed and developed the GASP based on truncated life tests, we determine the following stages for GASP based on NRPD.

Stage 1: Determine the group size g .

Stage 2: Select g items from a lot randomly and allocate r items to each group for the life test. The required sample size in the life test is $n = gr$

$$P(p) = \left[\sum_{i=0}^{c_1} \binom{rg}{i} p^i (1-p)^{rg-i} \right] \quad (5)$$

Stage 3: Determine the acceptance number c for every group and specify the termination time of the life test t_0 .

Stage 4: Implement the life test based on the g groups of items, simultaneously. Accept the lot if at most c failed items are found in every group by the termination time. Truncate the life test sand reject the lot if more than c failures are found in any group.

The chance of accepting group founded on the quantity of failures for all groups under reduced life test at the test time program is provided with

where p be the probability of receiving a failure with in the life test program t_0 , g be the size of tester, the acceptance number is c . It would be suitable to evaluate the termination time t_0 as a compound of the quantified percentile t_q^0 such that $t_0 = \delta_q^0 t_q^0$ and δ_q^0 be a constant.

$$p = 1 - \exp \left\{ \frac{-1}{2\sigma^2} \left(\frac{t_0}{\lambda} \right)^{2\gamma} \right\} = 1 - \exp \left\{ \frac{-1}{2\sigma^2} \left(\frac{\eta_q \delta_q^0}{t_q / t_q^0} \right)^{2\gamma} \right\} \quad (6)$$

In order to obtain the plan constraints for the proposed GASP, we follow the well-known double points on the Operating Characteristic (OC) curve approach considering both consumer's risk and the producer's risk. In this system, a standard level is clearly defined, and the proportion of lifetime at the percentile is t_q / t_q^0 . These percentile proportions are particularly useful for manufacturers to improve the quality level of their products. From the producer's perspective, the probability of accepting a group must be at least $(1 - \alpha)$ and p_1 is acceptable reliability

$$P_a(p_1) = \sum_{i=0}^c \binom{rg}{i} p_1^i (1 - p_1)^{rg-i} \geq 1 - \alpha \quad (7)$$

$$P_a(p_2) = \sum_{i=0}^c \binom{rg}{i} p_2^i (1 - p_2)^{rg-i} \leq \beta \quad (8)$$

where p_1 and p_2 are given by

$$p_1 = 1 - \exp \left(- \frac{1}{2\sigma^2} \left(\frac{\eta_q \delta_q^0}{t_q / t_q^0} \right)^{2\gamma} \right) \quad \text{and} \quad p_2 = 1 - \exp \left(- \frac{1}{2\sigma^2} \left(\eta_q \delta_q^0 \right)^{2\gamma} \right) \quad (9)$$

The probabilities are determined for various values of parameters σ and γ . Setting the producer's risk $\alpha = 0.05$ and the termination time $t_0 = \delta_q^0 t_q^0$ with $\delta_q^0 = 0.5$ and 1.0 we determine the minimum sample size n and the median lifetime at various stages of the customer's risk levels $\beta = 0.25, 0.10, 0.05, 0.01$ for median, outcomes are prevailing from Table 1 to Table 3. However, in Table 4, we display the design of constraints with using maximum likelihood estimates (MLE's) for $\hat{\sigma} = 105.5913$ and $\hat{\gamma} = 1.3415$ at the median. We observed that from Table 1 to 4, the proportion of percentile is increases, when the size of the groups g

Then, the targeted 100_q^{th} lifetime percentile, t_q^0 . Assume that t_q is the real 100_q^{th} lifetime percentile, also p can be written by

level (ARL). Thus, the manufacturer requires that a group must be accepted at different stages, specifically $t_q / t_q^0 = 2, 4, 6, 8, 10$ in Equation (6). From the customer's point of view, the probability of rejecting a group must be at most β , where p_2 is the Lot Tolerance Reliability Level (LTRL). In this case, consumer considers rejecting a group when $t_q / t_q^0 = 1$. This approach balances the interests of both producers and consumers in the sampling plan.

decreases for all the cases. Also, r increases from 5 to 10, the number of groups decreases.

4. DATA ANALYSIS

4.1. Report of the Planned System and Real Data Illustration

In this section, we illustrate the proposed group acceptance sampling plan with the help of real data set which is given by Lawless(2003) page-69 and arose in a study on the lifetime of automobile brake pads. The pads have a lifetime, denoting the number of kilometers driven before those are reduced to their minimum thickness (98 units):

38.7, 69.6, 86.7, 79.5, 49.2, 74.8, 43.8, 55.0, 42.4, 32.9, 100.6, 46.8, 73.8, 51.5, 67.6, 124.5, 46.7, 31.8, 89.5, 92.5,

44.1, 77.6, 60.3, 110.0, 61.9, 63.7, 103.6, 101.2, 39.3, 83.0, 82.6, 59.4, 49.8, 24.8, 88.0, 27.8, 46.3, 68.8, 42.4, 33.6, 56.2, 68.8, 68.9, 69.0, 50.5, 89.1, 95.7, 75.2, 54.9, 65.0, 78.1, 58.4, 54.0, 65.1, 83.6, 105.6, 49.2, 59.3, 18.6, 56.2, 44.8, 53.9, 92.6, 55.9, 72.2, 79.4, 42.4, 83.8, 107.8, 47.4, 34.3, 123.5, 81.6, 61.4, 105.6, 69.0, 45.2, 72.8, 20.8, 101.9, 124.6, 54.0, 52.0, 87.6, 64.0, 37.2, 77.2, 38.8, 83.0, 44.2, 68.9, 74.7, 143.6, 50.8, 78.7, 43.4, 65.5, 165.5.

By using the above real data set supposed to follow NRPD the maximum likelihood estimates of the two parameters are $\hat{\sigma} = 105.5913$ and $\hat{\gamma} = 1.3415$. To test the goodness of fit we apply Kolmogorov-Smirnov test, we found the maximum distance (D) between the real time data and the fitted data is 0.0649 and also the p-value is 0.8029. Hence, the NRPD is good fit for the life time of automobile brake pads data with known expected parameter values $\hat{\sigma} = 105.5913$ and $\hat{\gamma} = 1.3415$. The aim is to proposed

a group acceptance sampling plan that ensures the 50th percentile of the lifetime of automobile brake pads thickness is minimum. The producer's risk 5%, For $\hat{\sigma} = 105.5913$, $\hat{\gamma} = 1.3415$ and the consumer's risk is 25% with $r = 5, \delta_q^0 = 1.0, t_q/t_q^0 = 2$ the minimum number of group acceptance number is given in Table 4 is $g = 2, c = 3$ the plan's execution includes select 10 items are divided into two groups for each group include 5 items. We can accept the lot when no more than that 3 automobile brake pads were minimum thickness occur before 1 kilometre driven for each two groups. Based on this plan, the reduced to pads minimum thickness have been accepted since the automobile brake pads were only 3 failures before the 1 kilometre termination time..

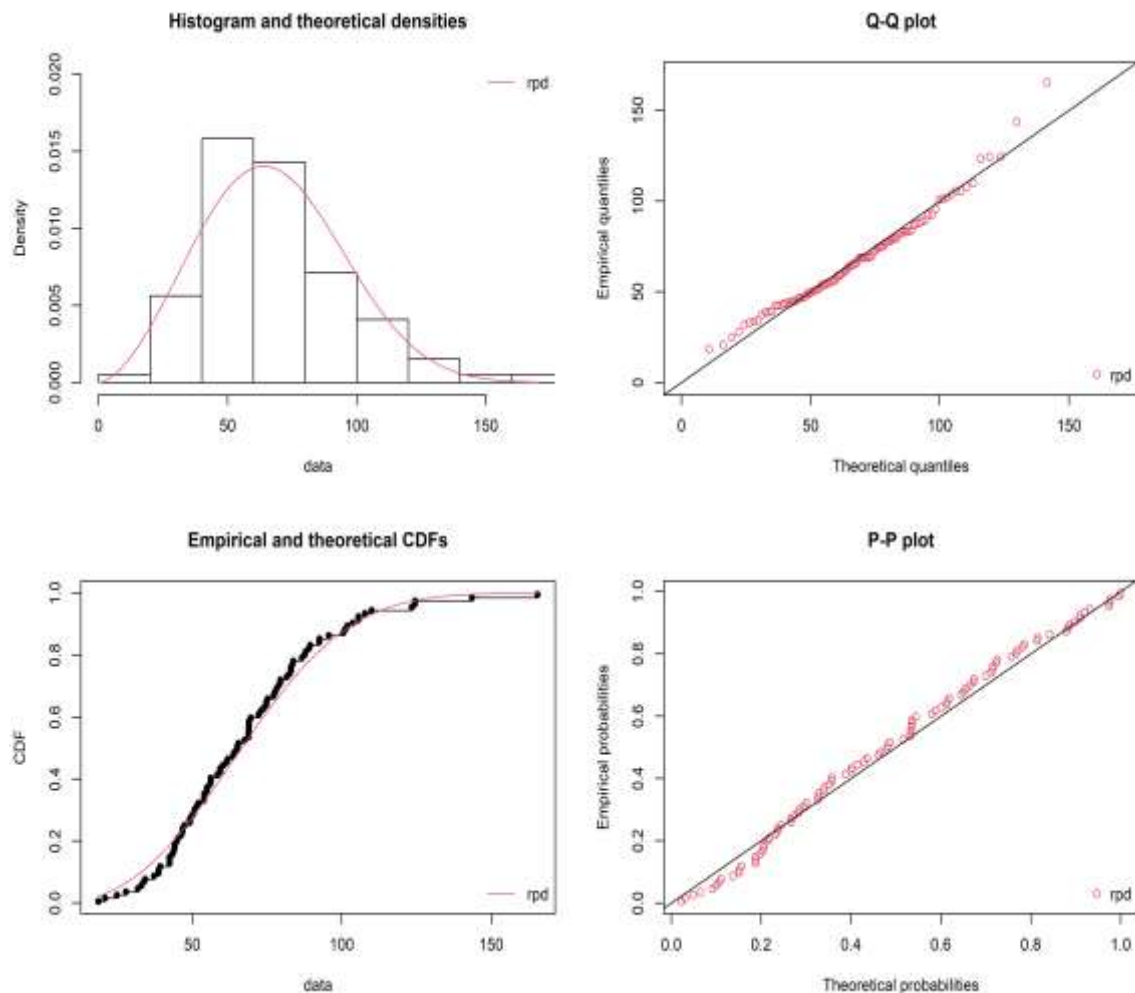


Figure 3.1: The theoretical density plot, Q-Q plot and Empirical CDFs plot, P-P plot for the NRPD lifetime of automobile brake pads data.

5. COMPARATIVE STUDY

In this section, we compare the new Rayleigh Pareto distribution (NRPD) and Odds exponential log-logistic distribution (OELLD) developed by Rosaiah *et al.* (2017)

the sample size in NRPD and OELLD at 50th percentile with $\delta_q^0 = 1.0, \sigma = 2.0, \gamma = 1.5, \beta = 0.01, r = 5$. we observed that the number of groups for NRPD is less when

compared to OELLD and these are presented in Table 5. Hence the proposed NRPD is better than the OELLD with respect to group size.

6. SUMMARY AND CONCLUSIONS

In this paper, we developed a group acceptance sampling plan for products whose lifetimes follow the NRPD. The plan parameters including the number of groups g and acceptance number c , are determined by simultaneously

considering both consumer's risk and producer's risk. The proposed plan, as the percentile proportion and r increase, the number of groups g decreases. To demonstrate the practical applicability of this approach, we consider real lifetime data from industrial use to illustrate the GASP. This combination of theoretical development and practical application provides a comprehensive framework for quality control and reliability testing.

Table 1: GASP for NRPD with $\sigma = 1.5$ and $\gamma = 1.5$.for 50th percentile

β	t_q/t_q^0	$r=5$			$r=10$								
		$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$			$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$		
		c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$
0.25	2	2	10	0.9832	2	2	0.9560	2	5	0.9832	2	1	0.9560
	4	0	4	0.9733	1	1	0.9989	0	2	0.9733	1	1	0.9951
	6	0	4	0.9920	0	1	0.9841	0	2	0.9920	0	1	0.9684
	8	0	4	0.9966	0	1	0.9933	0	2	0.9966	0	1	0.9866
	10	0	4	0.9983	0	1	0.9965	0	2	0.9983	0	1	0.9931
0.1	2	2	13	0.9667	2	2	0.9560	2	7	0.9599	2	1	0.9560
	4	0	6	0.9602	1	2	0.9951	0	3	0.9602	1	1	0.9951
	6	0	6	0.9880	0	1	0.9841	0	3	0.9880	0	1	0.9684
	8	0	6	0.9949	0	1	0.9933	0	3	0.9949	0	1	0.9866
	10	0	6	0.9974	0	1	0.9965	0	3	0.9974	0	1	0.9931
0.05	2	2	15	0.9524	3	3	0.9692	3	10	0.9766	4	2	0.9788
	4	0	7	0.9537	1	2	0.9951	1	6	0.9969	1	1	0.9951
	6	0	7	0.9861	0	1	0.9841	0	4	0.9841	0	1	0.9684
	8	0	7	0.9941	0	1	0.9933	0	4	0.9933	0	1	0.9866
	10	0	7	0.9970	0	1	0.9965	0	4	0.9965	0	1	0.9931
0.01	2	3	24	0.9585	4	4	0.9788	3	12	0.9585	4	2	0.9788
	4	1	16	0.9946	1	3	0.9889	1	8	0.9946	1	2	0.9806
	6	0	11	0.9782	0	2	0.9684	0	6	0.9762	0	1	0.9684
	8	0	11	0.9907	0	2	0.9866	0	6	0.9899	0	1	0.9866
	10	0	11	0.9952	0	2	0.9931	0	6	0.9948	0	1	0.9931

Table 2: GASP for NRPD with $\sigma = 2.0$ and $\gamma = 1.5$.for 50th percentile

β	t_q/t_q^0	$r=5$			$r=10$								
		$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$			$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$		
		c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$
0.25	2	2	10	0.9832	2	2	0.9560	2	5	0.9832	2	1	0.9560
	4	0	4	0.9733	1	1	0.9989	0	2	0.9733	1	1	0.9951
	6	0	4	0.9920	0	1	0.9841	0	2	0.9920	0	1	0.9684
	8	0	4	0.9966	0	1	0.9933	0	2	0.9966	0	1	0.9866
	10	0	4	0.9983	0	1	0.9965	0	2	0.9983	0	1	0.9931
0.1	2	2	13	0.9667	2	2	0.9560	2	7	0.9599	2	1	0.9560

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	4	0	6	0.9602	1	2	0.9951	0	3	0.9602	1	1	0.9951
	6	0	6	0.9880	0	1	0.9841	0	3	0.9880	0	1	0.9684
	8	0	6	0.9949	0	1	0.9933	0	3	0.9949	0	1	0.9866
	10	0	6	0.9974	0	1	0.9965	0	3	0.9974	0	1	0.9931
0.05	2	2	15	0.9524	3	3	0.9692	3	10	0.9766	4	2	0.9788
	4	0	7	0.9537	1	2	0.9951	1	6	0.9969	1	1	0.9951
	6	0	7	0.9861	0	1	0.9841	0	4	0.9841	0	1	0.9684
	8	0	7	0.9941	0	1	0.9933	0	4	0.9933	0	1	0.9866
	10	0	7	0.9970	0	1	0.9965	0	4	0.9965	0	1	0.9931
0.01	2	3	24	0.9585	4	4	0.9788	3	12	0.9585	4	2	0.9788
	4	1	16	0.9946	1	3	0.9889	1	8	0.9946	1	2	0.9806
	6	0	11	0.9782	0	2	0.9684	0	6	0.9762	0	1	0.9684
	8	0	11	0.9907	0	2	0.9866	0	6	0.9899	0	1	0.9866
	10	0	11	0.9952	0	2	0.9931	0	6	0.9948	0	1	0.9931

Table 3: GASP for NRPD with $\sigma = 1.5$ and $\gamma = 2.0$.for 50th percentile

$r=5$ $r=10$													
β	t_q/t_q^0	$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$			$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$		
		c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$
0.25	2	1	13	0.9864	1	1	0.9835	1	7	0.9844	2	1	0.9927
	4	0	7	0.9941	0	1	0.9866	0	4	0.9933	0	1	0.9733
	6	0	7	0.9988	0	1	0.9973	0	4	0.9987	0	1	0.9947
	8	0	7	0.9996	0	1	0.9992	0	4	0.9996	0	1	0.9983
	10	0	7	0.9998	0	1	0.9997	0	4	0.9998	0	1	0.9993
0.1	2	1	19	0.9723	2	2	0.9927	1	10	0.9696	2	1	0.9927
	4	0	11	0.9907	0	1	0.9866	0	6	0.9899	0	1	0.9733
	6	0	11	0.9982	0	1	0.9973	0	6	0.9980	0	1	0.9947
	8	0	11	0.9994	0	1	0.9992	0	6	0.9994	0	1	0.9983
	10	0	11	0.9998	0	1	0.9997	0	6	0.9997	0	1	0.9993
0.05	2	1	23	0.9608	2	3	0.9764	1	12	0.9577	3	2	0.9909
	4	0	14	0.9882	0	1	0.9866	0	7	0.9882	0	1	0.9733
	6	0	14	0.9977	0	1	0.9973	0	7	0.9977	0	1	0.9947
	8	0	14	0.9993	0	1	0.9992	0	7	0.9993	0	1	0.9983
	10	0	14	0.9997	0	1	0.9997	0	7	0.9997	0	1	0.9993
0.01	2	2	40	0.9825	2	3	0.9764	2	20	0.9825	3	2	0.9909
	4	0	22	0.9816	0	2	0.9733	0	11	0.9816	0	1	0.9733
	6	0	22	0.9963	0	2	0.9947	0	11	0.9963	0	1	0.9947
	8	0	22	0.9988	0	2	0.9983	0	11	0.9988	0	1	0.9983
	10	0	22	0.9995	0	2	0.9993	0	11	0.9995	0	1	0.9993

Table 4: GASP for NRPD with $\hat{\sigma} = 105.5913$ and $\hat{\gamma} = 1.3415$ for 50th percentile

β	t_q/t_q^0	$r=5$			$r=10$			$r=5$			$r=10$		
		$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$			$\delta_q^0 = 0.5$			$\delta_q^0 = 1.0$		
		c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$	c	g	$P_a(p_1)$
0.25	2	2	8	0.9711	3	2	0.9862	2	4	0.9711	3	1	0.9862
	4	0	3	0.9615	1	1	0.9973	0	3	0.9972	1	1	0.9886
	6	0	3	0.9869	0	1	0.9721	0	2	0.9825	0	1	0.9986
	8	0	3	0.9939	0	1	0.9870	0	2	0.9919	0	1	0.9742
	10	0	3	0.9966	0	1	0.9928	0	2	0.9955	0	1	0.9857
0.10	2	3	13	0.9766	4	3	0.9860	3	7	0.9703	4	2	0.9531
	4	1	8	0.9950	1	2	0.9886	1	4	0.9950	1	1	0.9886
	6	0	5	0.9782	0	1	0.9721	0	3	0.9739	1	1	0.9986
	8	0	5	0.9899	0	1	0.9870	0	3	0.9879	0	1	0.9742
	10	0	5	0.9944	0	1	0.9928	0	3	0.9933	0	1	0.9857
0.05	2	3	15	0.9639	4	4	0.9531	3	8	0.9550	4	2	0.9531
	4	1	9	0.9937	1	2	0.9886	1	5	0.9923	1	1	0.9886
	6	0	6	0.9739	0	1	0.9721	0	3	0.9739	1	1	0.9986
	8	0	6	0.9879	0	1	0.9870	0	3	0.9879	0	1	0.9742
	10	0	6	0.9933	0	1	0.9928	0	3	0.9933	0	1	0.9857
0.01	2	4	22	0.9625	4	4	0.9531	4	11	0.9625	4	2	0.9531
	4	1	13	0.9673	1	3	0.9748	1	7	0.9853	1	2	0.9568
	6	0	9	0.9611	1	3	0.9968	0	5	0.9569	1	2	0.9943
	8	0	9	0.9818	0	2	0.9742	0	5	0.9798	0	1	0.9742
	10	0	9	0.9900	0	2	0.9857	0	5	0.9889	0	1	0.9857

Table 5: Comparison between sample sizes of new Rayleigh Pareto distribution (NRPD) and Odds exponential log-logistic distribution (OELLD) with 50th percentiles for $\delta_q^0 = 1.0, \sigma = 2.0, \gamma = 1.5, \beta = 0.01, r = 5$.

β	t_q/t_q^0	NRPD			OELLD		
		c	g	$P_a(p_1)$	c	g	$P_a(p_1)$
0.01	2	4	4	0.9788	14	9	0.9511
	4	1	3	0.9889	4	4	0.9788
	6	0	2	0.9684	2	3	0.9707
	8	0	2	0.9866	2	3	0.9905

REFERENCES

1. Aslam M, Jun CH. A group acceptance sampling plan for truncated life test having Weibull distribution, *Journal of Applied Statistics*, 36, 1021-1027 (2009a).
2. Aslam M, Jun CH. A group acceptance sampling plan for truncated life tests based on the inverse Rayleigh and log-logistic distributions, *Pakistan Journal of Statistics*, 25(2), 107-119 (2009b).
3. Aslam, M., Jun, C.H., Rasool, M. and Ahmad, M; A time truncated two stage group sampling plan for Weibull distribution, *Communications of the Korean Statistical Society*, 17(1), 89-98 (2010).
4. Aslam M, Kundu D, Jun CH., and Ahmad M, Time truncated group acceptance sampling plans for generalized exponential distribution, *Journal of Testing and Evaluation*, 39(4), 671-677 (2011).
5. Al-Omari, Al, Al-Naseer, AD., and Ciavolino, E. Economic design of acceptance sampling plans for truncated life tests using three-parameter Lindley distribution, *J Mod Appl Stat Meth*, 18(2), 1-15 (2020).

6. Al-Omari, Al, Almanjahie, IM., and Kravchuk, O. Acceptance sampling plans with truncated life test for the length-biased weighted Lomax distribution, *Comput Mater Cont*, 67(1), 285-301(2021).
7. Ameerq, M., Naz,S., Tahir, M.H., Jamal, F., Shafiq, S., and Mendy, J.T. A group acceptance sampling plan based on flexible new Kumaraswamy exponential distribution: An application to quality control reliability, *Cogent Engineering*. 10(2), 1-16 (2023).
8. Amer Ibrahim Al-Omari and Mohd Tahir Ismail. Group acceptance sampling plans based on truncated life tests for Gamma Lindley distribution with real data applications, *Lobachevskii Journal of Mathematics*, 45(2), 578-590 (2024).
9. Baklizi, A. Acceptance sampling based on truncated life tests in the Pareto distribution of the second kind, *Advances and Applications in Statistics*, 3(1), 33-48 (2003).
10. Chinnamamba, C. Group acceptance sampling plan for life test based on Gumbel distribution, *Journal of Nonlinear Analysis and Optimization*,15(4), 201-209 (2024).
11. Harsh Tripathi, Sanku Dey., and Mahendra Saha. Double and group acceptance sampling plan for truncated life test based on inverse log-logistic distribution, *Journal of Applied Statistics*, 48(7), 1227-1242(2021).
12. Jyothi, P, Rao, G.S., and Rosaiah, K. New acceptance sampling plans based on percentiles for the new Rayleigh Pareto distribution, *Journal of Information and Computational Science*, 12(11),48-59 (2022).
13. Kareema Abed Al-Kadim., Bnadher Dhea'a Mohammed. Rayleigh Pareto Distribution, *Journal of Babylon University/Pure and Applied Sciences*, 26(1), 84-95 (2018).
14. Khan, K., Alquarni, A. A group acceptance sampling plan using mean lifetime as a quality parameter for inverse Weibull distribution, *Advanced Applied Statistics*, 64(2), 237-249 (2020).
15. Karthik Narayana, B., Siva Ramprasad, J., and Srinivasa Rao, B. Sampling scheme of group acceptance for life testing with the Half logistic distribution, *Journal of the Iranian Statistical Society*, 25(1), 91-103 (2026).
16. Lawless, J.F. (2003). Statistical Models and Methods for lifetime data, *John Wiley*: New York.
17. Mitchell, M.R., Link, R.E., Muhammad Aslam, Debasis Kundu, Chi-Hyuck Jun, and Munir Ahmad. Time Truncated Group Acceptance Sampling Plans for Generalized Exponential Distribution, *Journal of Testing and Evaluation*, 39(4), 1-8 (2011).
18. Naveen, Gupta and Rao, G.S. Modern acceptance sampling plans from truncated life tests based on percentiles for Exponentiated Weibull distribution, *The International Journal of Analytical and Experimental Model Analysis*, 12(4), 1760-1770 (2020).
19. Naveen, Gupta, J., Jilani, Syed., Bhanu Prakash, S., and Vasudeva Rao, A. Group acceptance sampling plans for life times following exponentiated Weibull distribution, *TPM-Testing, Psychometrics, Methodology in Applied Psychology*, 32(S9), 897-905 (2025).
20. Neena Krishna, P.K, Jayalaxmi. Designing of special type Double sampling plan for life tests based on percentiles using Exponentiated Frechet distribution, 16(1), 117-123 (2021).
21. Rao, G.S. and Kantam, R.R.L. Acceptance sampling plans from truncated life tests based on the log-logistic distribution for percentiles, *Economic Quality Control*,. 25(2), 153-167 (2010).
22. Rao, G.S., Rosaiah, K., Kalyani, K., and Sivakumar, D.C.U. Odds exponential log logistic distribution: A new acceptance sampling plans based on percentiles, *The Open Statistics & Probability Journal*, 7, 45-52 (2016).
23. Rao, G.S.,Rosaiah, K., Sivakumar, D.C.U., and Kalyani, K. Odd generalized exponential log logistic distribution: A new acceptance sampling plans based on percentiles, *International journal of Advances in Applied Sciences*, 8(3), 176-183 (2019).
24. Rao, B,S ., Lakshmi, K.N.V.R, Group acceptance sampling plans for life tests based on the new Weibull-Pareto distribution, *International Journal of Statistics and Economics*, 22(1), 76-86 (2021).
25. Rosaiah, K. & Kantam, R.R.L. Acceptance sampling based on the inverse Rayleigh distribution, *Economic Quality Control*, 20(2), 277-286 (2005).
26. Rosaiah, K, Rao, G.S., and Prasad, S.V.S.V.S.V, A group acceptance sampling plans based on truncated life tests for Type-II generalized log logistic distribution, *ProbStat Forum*, 9, 88-94 (2016).
27. Rosaiah, K., Rao, G.S., Kalyani, K., and Sivakumar, D.C.U. Group acceptance sampling plans for lifetimes following an Odds exponential log logistic distribution, *Sri Lankan Journal of Applied Statistics*, 17(3), 201-216 (2017).
28. Saha, M., Harsh Tripathi., and Sanku Dey, Single and Double acceptance sampling plans for truncated life tests based on transmuted Rayleigh distribution, *Journal of Industrial and Production Engineering*, 38(5), 356-368 (2021).
29. Srinivasa Rao, B., and Balasuseela, V.R. A hybrid group acceptance sampling plans for life tests based on the exponentiated inverted Weibull distribution,

Advances and Applications in Mathematical Sciences, 21(5), 2545-2558 (2022).

30. Sivakumar DCU, Rao GS, Rosaiah K., and Kalyani K. Double acceptance sampling plan for Odd generalized exponentiated log-logistic distribution based on truncated life test, *Universal Wiser Publisher, Digital manufacturing technology*, 3(1), 76-90 (2023).
31. Sridhar Babu, M., Rao, G.S., and Rosaiah, K. Double Acceptance Sampling Plan for Exponentiated Frechet distribution with known shape parameters,

Mathematical Problems in Engineering, Volume 2021, 1-9 (2021).

32. Tsai, T.R, Wu, S.J, Acceptance sampling based on truncated life tests for generalized Rayleigh distribution, *Journal of Applied Statistics*, 33, 595-600 (2006).