RELIABILITY SINGLE SAMPLING PLANS UNDER THE ASSUMPTION OF BURR TYPE XII DISTRIBUTION

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Abstract

Acceptance sampling or sampling inspection is an essential quality control technique which describes the rules and procedures for making decisions about the acceptance or rejection of a batch of commodities by the inspection of one or more samples. When quality of an item is evaluated based on the life time of the item, which can be adequately described by a continuous-type probability distribution, the plan is known as life test sampling plan. The application of Burr (XII) distribution in reliability sampling plans is considered in this article. A procedure for selection of the plan parameters to protect the both producer as well as the consumer indexed by the acceptable mean life and operating ratio is evolved. Application of proposed plan is discussed with the help of numerical illustrations. Evaluation of such plans is explained utilising a set of simulated observations from Burr (XII) distribution.

Keywords*:* Acceptable Mean Life, Operating Ratio, Burr Distribution, Reliability Sampling, Type I Censoring.

I. Introduction

Sampling inspection plans are used to determine the acceptability of a lot consisting of the finished products based on the inspection of sampled items. Lifetime of the items which are put under test is considered as an important characteristic in reliability sampling plans. While making the decision on the disposition of the lot based on life testing, the length or duration of the total time spent on the inspection of items would be a major constraint and hence, it would be desirable if a life test is terminated by specifying a time and observing the number of failures that occur before the pre-assigned time.

The utilization of several continuous probability distributions in the researches pertained to the construction and evaluation of life test sampling plans has been significantly outlined in the literature of product control. While important contributions have been made during the past five decades in the evolution of life test sampling plans employing exponential, Weibull, lognormal, gamma and other lifetime distributions, the literature also provides application of varied distributions for modelling lifetime data. Epstein [1, 2], Handbook H-108 [3], and Goode and Kao [4-6] proposed the construction of life test sampling plans using exponential and Weibull distributions.

The latest advancements in life tests sampling plans includes the works of Gupta [7], Schilling and Neubauer [8], Balakrishnan *et al*., [9], Kalaiselvi and Vijayaraghavan [10], Kalaiselvi *et al*., [11], Loganathan *et al*., [12], Vijayaraghavan *et al*., [13], Vijayaraghavan and Uma [14, 15] and Vijayaraghavan *et al*., [16, 17].

Burr [18] introduced a system of twelve continuous distributions and one among them is termed as the Burr type XII distribution or simply Burr distribution. It is also considered as a generalized log-logistic distribution. Literature in reliability theory advocates the adoptability of the family of Burr-type distributions for modeling lifetime data and for modeling the concept with monotone and unimodal failure rates. The Burr type XII is often considered as a suitable model for failure data. Similar to the log-normal distribution, it has a non-monotone hazard function which can accommodate many shapes of hazard.

Zimmer and Burr [19] considered a wide range of values for the degrees of skewness and kurtosis using a class of Burr distributions and developed the method of deriving variables sampling plans for non-normal populations based on the measures of skewness and kurtosis. Rodriguez [20, 21] has used measures of skewness and kurtosis of Burr distribution to derive the area in the plane based on the Burr type II distribution. Tadikamalla [22] has summarized the relationship between the Burr type II distribution and other distributions such as Lomax, compound Weibull, Weibull-Exponential, logistic, log logistic, Weibull and Kappa family of distributions. Zimmer *et al*., [23] discussed the statistical and probabilistic properties of the Burr type XII distribution and its relationship to other distributions used in reliability analyses.

Lio *et al*., [24] developed single sampling plans based on the percentiles of the Burr type XII distribution percentiles when the life test is truncated at a pre-specified time. Following this, Aslam *et al*., [25] discussed a two-stage group sampling procedure for the Burr type XII distribution percentiles to save sample resource with a truncated censoring scheme. Rao *et al*., [26] attempted to estimate multi-component stress-strength reliability assuming the Burr type XII distribution. Application of Burr distribution in reliability sampling is now considered with a particular reference to single sampling plans.

II. Burr Distribution

Let T be the lifetime of the component, which is considered as a random variable. Assume that T follows the Burr distribution. The probability density function and cumulative distribution function of T are, respectively, given by

$$f(t;\theta,\eta,\delta)=\frac{\eta\delta}{\theta}\left(\frac{t}{\theta}\right)^{\eta-1}\left[1+\left(\frac{t}{\theta}\right)^{\eta}\right]^{-\delta-1},\ t>0,\theta>0,\eta>0,\delta>0 \tag{1}$$

and

$$F(t;\theta,\eta,\delta)=1-\left[1+\left(\frac{t}{\theta}\right)^{\eta}\right]^{-\delta},\ t>0,\theta>0,\eta>0,\delta>0 \tag{2}$$

where η and δ are the shape parameters, and θ is the scale parameter.
The mean life time of Burr distribution is given by

$$\mu = E(t) = \theta \frac{\Gamma(1+1/\eta)\Gamma(\delta - 1/\eta)}{\Gamma(\delta)}, \tag{3}$$

The failure proportion, p, of product before time *t*, is expressed by

$$p = P(T \le t) = F(t;\theta,\eta,\delta) \tag{4}$$

III. Procedure to Determine the Operating Characteristics

The acceptance probabilities of lot of items under a single sampling plan is explained as a function of the failure probability *p* and is expressed by

$$P_a(p) = \sum_{x:0}^{c} p(x). \tag{5}$$

The probability of acceptance under the specified conditions of binomial or Poisson distributions can be obtained utilising the corresponding expressions in (5).

It can be noted that the failure probability, *p*, is a function of *t*, δ and θ, as expressed in (4). Corresponding to a specific value of *p*, a unique value of t/θ would exist and can be derived as a function of *p*, η and δ using (2) and (4) as

$$\frac{t}{\theta} = \left((1-p)^{-1/\delta} - 1\right)^{1/\eta}. \tag{6}$$

Using (3) and (6), the expression for t/μ is obtained as

$$\frac{t}{\mu} = \left[(1-p)^{-1/\delta} - 1)\right]^{1/\eta} \frac{\Gamma(\delta)}{\Gamma\left(1+\frac{1}{\eta}\right)\Gamma\left(\delta - \frac{1}{\eta}\right)}. \tag{7}$$

Every single value of *p* is connected with distinct value t/μ, thus the OC function of RSSP is regarded as a function of t/μ. Plot the acceptance probabilities against the values of t/μ. The resulting figure would be the required OC curve.

IV. Empirical Analysis of Operating Characteristic Curves

It can be noted that the RSSP based on Burr (XII) distribution is specified by the parameters n, c, θ ,η and δ. As the failure probability *p* is associated with the distribution function, which is a function of t/θ, the acceptance probabilities in turn can be computed for given sets of values of *n*, *c*, η and δ. The acceptance probabilities of the submitted lot under the RSSP are computed against the ratio $E(t)/\mu_0 = \mu/\mu_0$ for different combinations of parameters n, *c* and δ . Here, μ and μ_0 represent the expected mean life and assumed mean life, respectively. It is to be noted that changes in the values of these parameters will influence the shape of the OC function. In order to explore the impact of the parameters an empirical analysis of the OC curves drawn for various sets of parameters is carried out.

Figure 1 displays the curves for varying values of η, and fixed values of *n*, *c* and δ, Figure 2 exhibit the curves for different values of δ, and the fixed values of n, c and η. Similarly, Figures 3 and 4 display the sets of curves for varying values of *n* and *c*, respectively, fixing the values of shape parameters. The curves exhibit the probabilities of acceptance of the lot against the values of μ / μ_0. From these figures, the following properties are observed: For any specified value of μ / μ_0, $P_a(p)$ increases as η increases; $P_a(p)$ increases as δ increases, $P_a(p)$ decreases as n increases; and $P_a(p)$ increases as c increases.

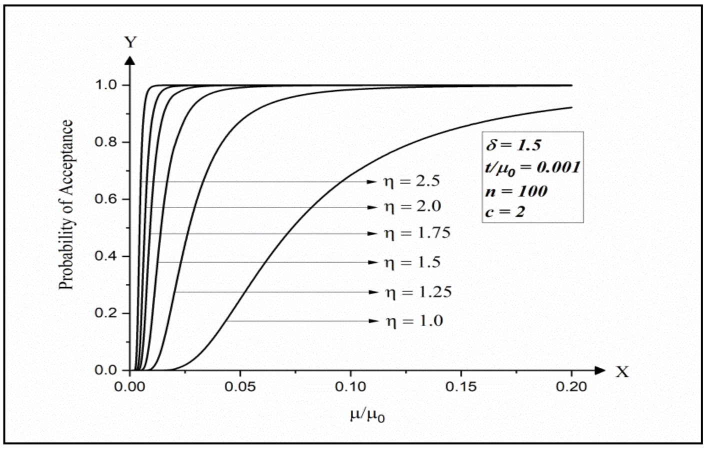

Figure 1: OC Curves of Single Sampling Plans for Life Tests Based on the Burr Distribution for Varying η with Fixed $n = 100, c = 2$ and $\delta = 1.5$

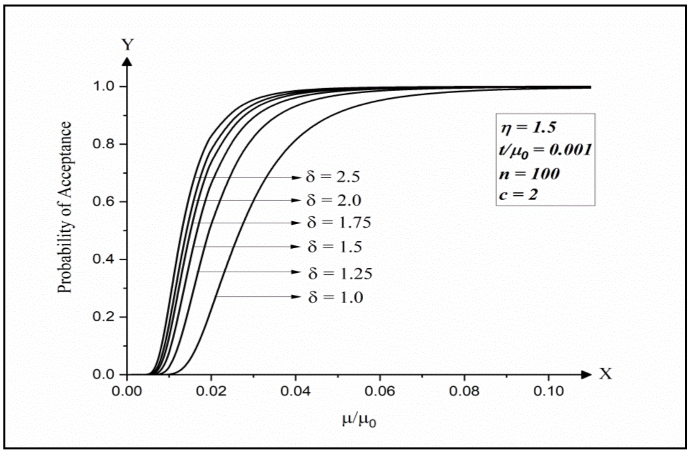

Figure 2: OC Curves of Single Sampling Plans for Life Tests Based on the Burr Distribution for Varying δ with Fixed $n = 100, c = 2$ and $\eta = 1.5$

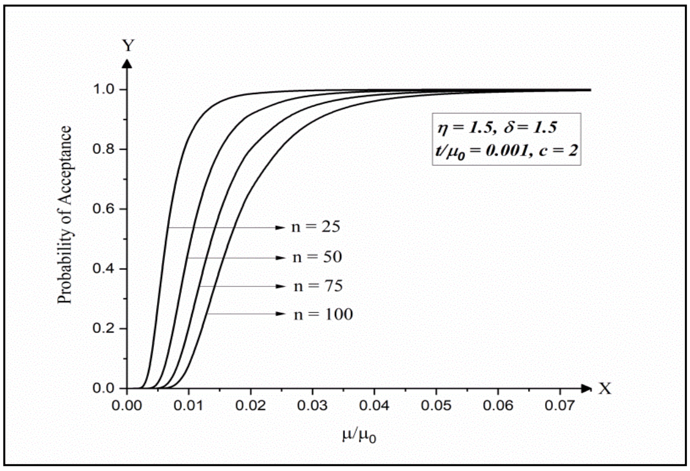

Figure 3: OC Curves of Single Sampling Plans for Life Tests Based on the Burr Distribution for Varying n with Fixed $c = 2, \eta = 1.5$ and $\delta = 1.5$

Hence, for any given value of μ / μ_0, for smaller values of η, the acceptance probabilities are lesser; for smaller values of δ, the acceptance probabilities are lesser; protection to the producer is greater with larger acceptance probabilities for smaller sample sizes as the expected mean life moves towards the assumed mean life; the consumer gets more protection with smaller acceptance probabilities for larger sample sizes when the expected mean life is much smaller than the assumed mean life; smaller the acceptance number, greater is the protection to the consumer; and larger the acceptance number, greater is the protection to the producer.

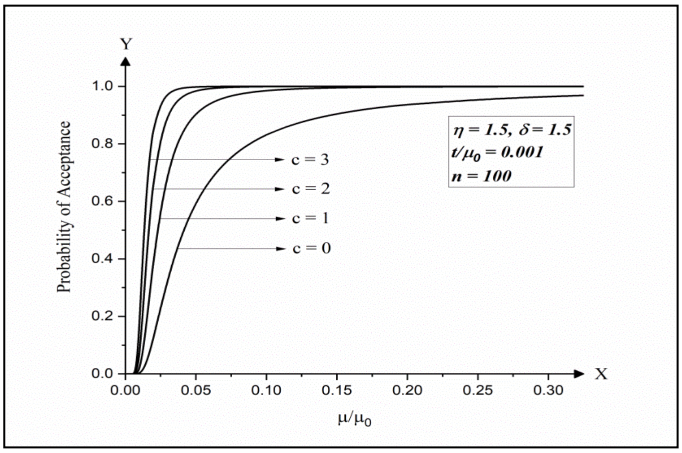

Figure 4: OC Curves of Single Sampling Plans for Life Tests Based on the Burr Distribution for Varying *c* with Fixed $n = 100$, $\eta = 1.5$ and $\delta = 1.5$

V. Procedure for the Construction of Reliability Single Sampling Plan

Vijayaraghavan and Uma (2016), discussed the procedures for obtaining the values of p_0 and p_1 in association with t/μ_0 and t/μ_1, respectively. In reliability sampling, a specific sampling plan for life tests can be obtained so that the OC curve must pass through two locations, namely, (μ_0, α) and (μ_1, β), which are associated with the risks α and β.

The two conditions specified below must be satisfied, for obtaining the optimum plan parameters with fixed value of α and β, respectively:

$$P_a(\mu_0) \geq 1 - \alpha \tag{8}$$

and

$$P_a(\mu_1) \leq \beta. \tag{9}$$

Based on the search procedure, the optimum single sampling plans under Burr (XII) distribution for a range of values of μ_0 / μ_1, t / μ_0, η and δ are determined and tabulated in Table 1 associated $\alpha = 0.05$ and $\beta = 0.10$.

VI. Numerical Illustrations

I. Illustration 1

A life test sampling plan is to be instituted under the condition that the life time follows the Burr distribution when the acceptable mean life and unacceptable mean life are prescribed as 6000 *hours* and 3000 *hours*, respectively, with the producer's and consumer's risks fixed as $\alpha = 0.05$ and $\beta = 0.10$. The past history from an industrial process yields the estimates of the shape parameters as $\eta = 1.5$ and $\delta = 1.5$. The experimenter wishes to terminate the life test at *t* = 240 *hours*. For the given requirements, the values of t/μ_0 and t/μ_1 are obtained as 0.04 and 0.08, respectively and the operating ratio is R = 2.0. From Table 1, the optimum single sampling plan is determined as n = 319 and c = 8.

II. Illustration 2

An industrial practitioner is interested to find out a single sampling plan for its implementation to make a decision about the disposition of a submitted lot of manufactured products whose lifetime follows the Burr distribution. The test termination time for the items to be inspected has been fixed as t = 325 *hours*. In order to obtain the required sampling plan, experimental results are observed to estimate the shape parameters. The estimates of δ and η from the experimental results are obtained as 2.0 and 1.5, respectively.

With these values, the acceptable and unacceptable proportions of the lot failing before time, t, are determined as $p_0 = 0.0574$ and $p_1 = 0.18$, respectively, which correspond to the producer's and consumer's risks fixed at the levels $\alpha = 0.05$ and $\beta = 0.10$. Associated with $p_0 = 0.0574$ and $p_1 = 0.18$ are the values of t/μ_0 and t/μ_1, which are obtained as 0.03 and 0.105, respectively. Thus, the value of the operating ratio is obtained as R = 3.5.

When entered Table 1 with these values, the parameters of the optimum single sampling plan are obtained as n = 139 and c = 3. For the specified requirements under the optimum plan, the acceptable mean life and unacceptable mean life are, respectively, obtained as $\mu_0 = t/0.03 = 10833$ *hours* and $\mu_1 = t/0.105 = 3095$ *hours*.

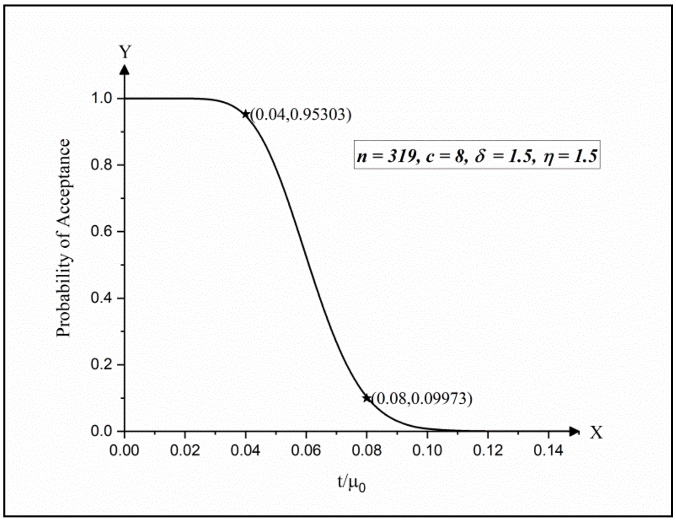

Figure 5: OC Curve of an Optimum Single Sampling Plan for Life Tests Based on the Burr Distribution Having Parameters $n = 319, c = 8, \eta = 1.5$ and $\delta = 1.5$

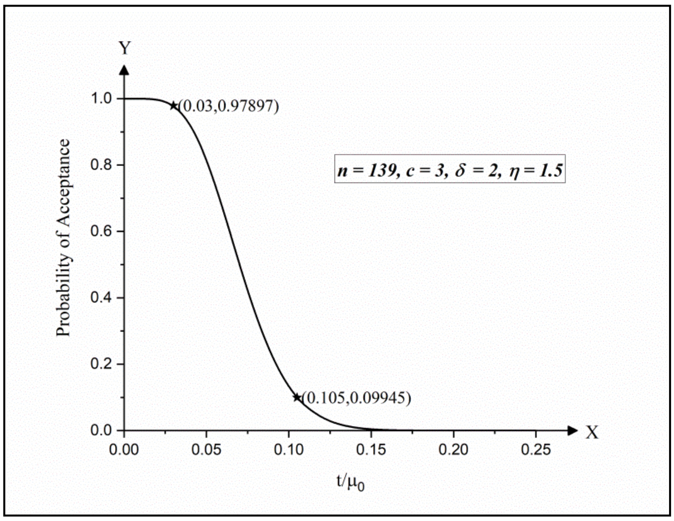

Figure 6: OC Curve of an Optimum Single Sampling Plan for Life Tests Based on the Burr Distribution Having Parameters $n = 139, c = 3, \eta = 1.5$ and $\delta = 2.0$

In order to exhibit the practical performance of the optimum sampling plane determined in the above two illustrations, their operating characteristic curves are drawn, which are displayed in Figures 5 and 6. It can be observed from these figures that the operating characteristic curves pass through the desired points $(p_0, 1-\alpha)$ and (p_1, β).

III. Illustration Based on Simulated Data

A life test sampling plan is to be instituted under the condition that the life time follows the Burr distribution when the acceptable mean life and unacceptable mean life are prescribed as 6000 *hours* and 3000 *hours*, respectively, with the producer's and consumer's risks fixed as $\alpha = 0.05$ and $\beta = 0.10$.

A set of 100 observations is simulated from Burr distribution with shape parameters $\eta = 1.5$ and $\delta = 1.5$. The life test is decided to terminate at *t* = 240 *hours*. For the given requirements, the values of t/μ_0 and t/μ_1 are obtained as 0.04 and 0.2, respectively and the operating ratio is *R* = 5.0. From Table 1, the optimum single sampling plan is determined as *n* = 35 and *c* = 2.

Simulated observations are: 2398, 1149, 621, 1979, 202, 4859, 133, 99, 655, 1386, 1963, 2132, 13078, 2311, 197, 1734, 13466, 3457, 1077, 4912, 145, 4719, 1833, 1858, 996, 1277, 2450, 18659, 595, 2821, 605, 389, 866, 1366, 1835, 5822, , 33200, 214, 1089, 875, 4660, 660, 466, 1511, 1655, 2126, 1475, 733, 3218, 3439, 1609, 4342, 542, 2709, 4924, 559, 2657, 1373, 2271, 4159, 4829, 636, 437, 668, 2472, 1218, 2278, 258, 2695, 2581, 5282, 2391, 1931, 2293, 1000, 1337, 371, 2201, 896, 115, 6033, 4690, 175, 2602, 2866, 719, 1214, 1629, 3202, 1617, 687, 289, 1357, 56, 4183, 962, 641, 630, 2326 and 3555.

Random sample of 35 observations from the simulated data were 99, 145, 289, 437, 559, 595, 668, 687, 719, 875, 996, 1000, 1157, 1218, 1337, 1511, 1609, 1655, 1734, 1835, 1979, 2132, 2201, 2278, 2311, 2391, 2472, 3202, 4183, 4342, 4719, 4829, 4912, 6033 and 33200

Since the random sample contains two failures before time t=240, the lot is considered as accepted.

VII. Conclusion

Reliability single sampling plans are proposed based on Burr (XII) distribution. The procedures for choosing single sampling plans are developed. Tables are presented for choosing parameters of reliability sampling plans indexed by acceptable mean life and operating ratio for the preassigned time *t* with few specified values of shape parameters.

Table 1: *Optimum Parameters of RSSP Based on Burr (XII) Distribution for Certain Sets of Shape Parameters (Key: n, c)*

$R = \mu_0 / \mu_1$	$t / \mu_0 = 0.01$							
	$\delta = 1.5$				$\delta = 2.0$			
	$\eta = 1.0$	$\eta = 1.25$	$\eta = 1.5$	$\eta = 2.0$	$\eta = 1.0$	$\eta = 1.25$	$\eta = 1.5$	$\eta = 2.0$
10.00	21, 2	34, 1	69, 1	155, 0	29, 2	44, 1	87, 1	188, 0
9.50	22, 2	36, 1	74, 1	171, 0	31, 2	47, 1	94, 1	208, 0
9.00	23, 2	38, 1	80, 1	191, 0	32, 2	50, 1	101, 1	231, 0
8.50	24, 2	41, 1	87, 1	214, 0	34, 2	54, 1	110, 1	259, 0
8.00	25, 2	44, 1	95, 1	241, 0	36, 2	58, 1	121, 1	293, 0
7.50	27, 2	47, 1	105, 1	274, 0	38, 2	62, 1	133, 1	333, 0
7.00	36, 3	51, 1	116, 1	315, 0	41, 2	68, 1	147, 1	382, 0
6.50	38, 3	77, 2	129, 1	616, 1	55, 3	101, 2	164, 1	748, 1
6.00	41, 3	84, 2	145, 1	723, 1	59, 3	112, 2	185, 1	878, 1
5.50	45, 3	94, 2	165, 1	860, 1	64, 3	124, 2	210, 1	1044, 1
5.00	58, 4	105, 2	190, 1	1040, 1	70, 3	140, 2	242, 1	1263, 1
4.75	61, 4	112, 2	281, 2	1152, 1	89, 4	149, 2	358, 2	1399, 1
4.50	64, 4	150, 3	305, 2	1283, 1	93, 4	200, 3	388, 2	1559, 1
4.25	68, 4	161, 3	332, 2	1438, 1	99, 4	214, 3	422, 2	1748, 1
4.00	83, 5	173, 3	363, 2	1623, 1	121, 5	231, 3	462, 2	1973, 1
3.75	89, 5	187, 3	400, 2	1846, 1	129, 5	250, 3	509, 2	2244, 1
3.50	107, 6	244, 4	443, 2	2119, 1	157, 6	326, 4	564, 2	2576, 1
3.25	129, 7	267, 4	621, 3	3363, 2	168, 6	357, 4	791, 3	4087, 2
3.00	153, 8	342, 5	699, 3	3946, 2	203, 7	457, 5	892, 3	4796, 2
2.75	182, 9	432, 6	953, 4	4695, 2	267, 9	578, 6	1215, 4	5707, 2
2.50	233, 11	543, 7	1275, 5	7130, 3	342, 11	727, 7	1626, 5	8668, 3
2.25	312, 14	747, 9	1694, 6	8802, 3	460, 14	1000, 9	2162, 6	10700, 3
2.00	450, 19	1081, 12	2493, 8	15464, 5	664, 19	1448, 12	3182, 8	18800, 5
1.90	536, 22	1304, 14	3191, 10	17134, 5	790, 22	1747, 14	4073, 10	20830, 5
1.80	651, 26	1556, 16	3728, 11	21678, 6	962, 26	2085, 16	4758, 11	26355, 6
1.70	825, 32	2012, 20	4924, 14	29985, 8	1186, 31	2696, 20	6286, 14	36455, 8
1.60	1090, 41	2623, 25	6632, 18	40132, 10	1576, 40	3516, 25	8466, 18	48791, 10
1.50	1487, 54	3715, 34	9319, 24	56185, 13	2200, 54	4981, 34	11897, 24	68308, 13
$R = \mu_0 / \mu_1$	$t / \mu_0 = 0.02$							
	$\delta = 1.5$				$\delta = 2.0$			
	$\eta = 1.0$	$\eta = 1.25$	$\eta = 1.5$	$\eta = 2.0$	$\eta = 1.0$	$\eta = 1.25$	$\eta = 1.5$	$\eta = 2.0$
10.00	12, 2	15, 1	26, 1	40, 0	16, 2	20, 1	32, 1	48, 0
9.50	13, 2	16, 1	28, 1	44, 0	17, 2	21, 1	34, 1	53, 0
9.00	13, 2	17, 1	30, 1	49, 0	18, 2	22, 1	37, 1	59, 0
8.50	14, 2	18, 1	32, 1	54, 0	18, 2	24, 1	40, 1	66, 0
8.00	14, 2	20, 1	35, 1	61, 0	19, 2	25, 1	44, 1	74, 0
7.50	19, 3	21, 1	38, 1	69, 0	21, 2	27, 1	48, 1	84, 0
7.00	20, 3	31, 2	42, 1	80, 0	28, 3	41, 2	53, 1	96, 0
6.50	21, 3	34, 2	47, 1	156, 1	29, 3	44, 2	59, 1	189, 1
6.00	23, 3	37, 2	53, 1	182, 1	32, 3	49, 2	67, 1	221, 1
5.50	24, 3	41, 2	60, 1	217, 1	34, 3	54, 2	76, 1	263, 1
5.00	32, 4	46, 2	94, 2	262, 1	44, 4	60, 2	87, 1	317, 1
4.75	33, 4	49, 2	102, 2	290, 1	47, 4	64, 2	128, 2	351, 1
4.50	35, 4	66, 3	110, 2	322, 1	49, 4	86, 3	139, 2	391, 1
4.25	42, 5	70, 3	119, 2	361, 1	60, 5	92, 3	151, 2	438, 1
4.00	45, 5	75, 3	130, 2	407, 1	63, 5	99, 3	165, 2	495, 1
3.75	54, 6	81, 3	143, 2	463, 1	67, 5	107, 3	182, 2	562, 1
3.50	57, 6	106, 4	199, 3	532, 1	81, 6	139, 4	253, 3	645, 1
3.25	68, 7	115, 4	222, 3	843, 2	98, 7	153, 4	282, 3	1024, 2
3.00	81, 8	147, 5	250, 3	989, 2	116, 8	195, 5	318, 3	1201, 2
2.75	96, 9	186, 6	340, 4	1176, 2	138, 9	247, 6	433, 4	1429, 2
2.50	122, 11	233, 7	455, 5	1786, 3	176, 11	310, 7	578, 5	2170, 3
2.25	163, 14	320, 9	604, 6	2204, 3	236, 14	425, 9	768, 6	2678, 3
2.00	245, 20	462, 12	887, 8	3871, 5	340, 19	615, 12	1130, 8	4704, 5
1.90	289, 23	557, 14	1135, 10	4288, 5	405, 22	742, 14	1446, 10	5212, 5

Table 1 (Continued)

$R=\mu_0/\mu_1$	$t/\mu_0=0.02$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
1.80	349, 27	698, 17	1325, 11	5425, 6	492, 26	885, 16	1689, 11	6593, 6
1.70	439, 33	857, 20	1750, 14	7503, 8	623, 32	1144, 20	2230, 14	9119, 8
1.60	576, 42	1155, 26	2356, 18	10041, 10	823, 41	1542, 26	3003, 18	12205, 10
1.50	794, 56	1622, 35	3310, 24	14056, 13	1122, 54	2111, 34	4219, 24	17086, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.03$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	9, 2	10, 1	15, 1	18, 0	12, 2	13, 1	18, 1	22, 0
9.50	9, 2	11, 1	16, 1	20, 0	12, 2	13, 1	20, 1	24, 0
9.00	10, 2	11, 1	17, 1	22, 0	13, 2	14, 1	21, 1	27, 0
8.50	10, 2	12, 1	19, 1	25, 0	13, 2	15, 1	23, 1	30, 0
8.00	13, 3	13, 1	20, 1	28, 0	14, 2	16, 1	25, 1	33, 0
7.50	14, 3	19, 2	22, 1	32, 0	19, 3	17, 1	27, 1	38, 0
7.00	15, 3	20, 2	24, 1	36, 0	20, 3	26, 2	30, 1	43, 0
6.50	16, 3	22, 2	27, 1	70, 1	21, 3	28, 2	33, 1	85, 1
6.00	17, 3	24, 2	30, 1	82, 1	22, 3	30, 2	37, 1	99, 1
5.50	21, 4	26, 2	34, 1	98, 1	24, 3	34, 2	42, 1	118, 1
5.00	23, 4	29, 2	53, 2	118, 1	31, 4	38, 2	66, 2	142, 1
4.75	24, 4	39, 3	57, 2	130, 1	33, 4	40, 2	71, 2	157, 1
4.50	29, 5	41, 3	61, 2	145, 1	34, 4	53, 3	77, 2	175, 1
4.25	30, 5	44, 3	66, 2	162, 1	42, 5	57, 3	84, 2	196, 1
4.00	32, 5	47, 3	72, 2	182, 1	44, 5	61, 3	91, 2	221, 1
3.75	38, 6	51, 3	80, 2	207, 1	53, 6	66, 3	100, 2	251, 1
3.50	40, 6	66, 4	110, 3	238, 1	56, 6	86, 4	139, 3	288, 1
3.25	48, 7	72, 4	123, 3	377, 2	67, 7	94, 4	155, 3	457, 2
3.00	57, 8	91, 5	138, 3	441, 2	80, 8	120, 5	175, 3	535, 2
2.75	73, 10	115, 6	188, 4	525, 2	95, 9	151, 6	238, 4	637, 2
2.50	92, 12	144, 7	250, 5	796, 3	121, 11	189, 7	317, 5	966, 3
2.25	120, 15	196, 9	332, 6	982, 3	162, 14	260, 9	421, 6	1192, 3
2.00	170, 20	283, 12	487, 8	1724, 5	232, 19	375, 12	619, 8	2094, 5
1.90	200, 23	341, 14	623, 10	1909, 5	276, 22	452, 14	791, 10	2319, 5
1.80	249, 28	427, 17	727, 11	2415, 6	335, 26	566, 17	924, 11	2934, 6
1.70	311, 34	524, 20	959, 14	3340, 8	424, 32	696, 20	1220, 14	4057, 8
1.60	406, 43	706, 26	1291, 18	4469, 10	560, 41	938, 26	1642, 18	5430, 10
1.50	555, 57	990, 35	1812, 24	6255, 13	776, 55	1283, 34	2306, 24	7600, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.04$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	8, 2	8, 1	11, 1	11, 0	10, 2	9, 1	13, 1	13, 0
9.50	8, 2	8, 1	11, 1	12, 0	10, 2	10, 1	13, 1	14, 0
9.00	8, 2	9, 1	12, 1	13, 0	10, 2	10, 1	14, 1	15, 0
8.50	8, 2	9, 1	13, 1	15, 0	11, 2	11, 1	16, 1	17, 0
8.00	11, 3	13, 2	14, 1	16, 0	11, 2	12, 1	17, 1	19, 0
7.50	12, 3	14, 2	15, 1	18, 0	15, 3	17, 2	18, 1	22, 0
7.00	12, 3	15, 2	16, 1	21, 0	16, 3	19, 2	20, 1	25, 0
6.50	13, 3	16, 2	18, 1	41, 1	17, 3	20, 2	22, 1	49, 1
6.00	13, 3	18, 2	20, 1	47, 1	18, 3	22, 2	25, 1	57, 1
5.50	17, 4	19, 2	23, 1	56, 1	23, 4	24, 2	28, 1	67, 1
5.00	18, 4	21, 2	35, 2	67, 1	25, 4	27, 2	44, 2	81, 1
4.75	19, 4	28, 3	38, 2	74, 1	26, 4	29, 2	47, 2	89, 1
4.50	23, 5	30, 3	41, 2	82, 1	27, 4	38, 3	51, 2	99, 1
4.25	24, 5	32, 3	44, 2	92, 1	33, 5	41, 3	55, 2	111, 1
4.00	25, 5	34, 3	48, 2	104, 1	34, 5	44, 3	60, 2	125, 1
3.75	30, 6	44, 4	53, 2	118, 1	41, 6	47, 3	66, 2	142, 1
3.50	36, 7	47, 4	73, 3	135, 1	44, 6	61, 4	92, 3	163, 1
3.25	38, 7	51, 4	81, 3	213, 2	52, 7	67, 4	102, 3	258, 2

Table 1 (Continued)

$R=\mu_0/\mu_1$	$t/\mu_0=0.04$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
3.00	49, 9	65, 5	91, 3	250, 2	62, 8	85, 5	115, 3	302, 2
2.75	57, 10	82, 6	124, 4	297, 2	73, 9	107, 6	156, 4	359, 2
2.50	72, 12	103, 7	165, 5	450, 3	93, 11	134, 7	208, 5	545, 3
2.25	94, 15	140, 9	218, 6	554, 3	124, 14	184, 9	276, 6	672, 3
2.00	132, 20	201, 12	319, 8	972, 5	186, 20	265, 12	404, 8	1180, 5
1.90	162, 24	242, 14	408, 10	1077, 5	220, 23	319, 14	517, 10	1307, 5
1.80	194, 28	303, 17	510, 12	1361, 6	266, 27	400, 17	604, 11	1653, 6
1.70	248, 35	387, 21	628, 14	1882, 8	334, 33	491, 20	797, 14	2286, 8
1.60	321, 44	500, 26	845, 18	2518, 10	438, 42	661, 26	1072, 18	3058, 10
1.50	436, 58	701, 35	1185, 24	3524, 13	603, 56	927, 35	1505, 24	4280, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.05$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	9, 3	6, 1	8, 1	7, 0	8, 2	8, 1	10, 1	9, 0
9.50	9, 3	7, 1	9, 1	8, 0	8, 2	8, 1	10, 1	9, 0
9.00	9, 3	7, 1	9, 1	9, 0	9, 2	8, 1	11, 1	10, 0
8.50	9, 3	7, 1	10, 1	10, 0	9, 2	9, 1	12, 1	11, 0
8.00	10, 3	11, 2	11, 1	11, 0	12, 3	9, 1	13, 1	13, 0
7.50	10, 3	11, 2	11, 1	12, 0	13, 3	14, 2	14, 1	14, 0
7.00	11, 3	12, 2	12, 1	23, 1	13, 3	15, 2	15, 1	16, 0
6.50	11, 3	13, 2	14, 1	27, 1	14, 3	16, 2	16, 1	32, 1
6.00	14, 4	14, 2	15, 1	31, 1	15, 3	17, 2	18, 1	37, 1
5.50	15, 4	15, 2	17, 1	37, 1	19, 4	19, 2	21, 1	44, 1
5.00	18, 5	21, 3	26, 2	44, 1	21, 4	21, 2	32, 2	52, 1
4.75	19, 5	22, 3	28, 2	48, 1	21, 4	22, 2	35, 2	58, 1
4.50	20, 5	24, 3	30, 2	54, 1	22, 4	30, 3	37, 2	64, 1
4.25	24, 6	25, 3	33, 2	60, 1	27, 5	32, 3	40, 2	72, 1
4.00	25, 6	27, 3	35, 2	67, 1	29, 5	34, 3	44, 2	81, 1
3.75	26, 6	34, 4	39, 2	76, 1	34, 6	44, 4	48, 2	92, 1
3.50	30, 7	37, 4	54, 3	87, 1	36, 6	47, 4	67, 3	105, 1
3.25	36, 8	40, 4	59, 3	138, 2	43, 7	52, 4	74, 3	166, 2
3.00	41, 9	51, 5	66, 3	161, 2	51, 8	66, 5	83, 3	195, 2
2.75	48, 10	64, 6	90, 4	191, 2	60, 9	83, 6	113, 4	231, 2
2.50	64, 13	80, 7	120, 5	289, 3	82, 12	103, 7	150, 5	350, 3
2.25	83, 16	108, 9	158, 6	356, 3	108, 15	141, 9	199, 6	432, 3
2.00	114, 21	155, 12	231, 8	624, 5	153, 20	203, 12	292, 8	757, 5
1.90	139, 25	198, 15	295, 10	691, 5	180, 23	245, 14	373, 10	838, 5
1.80	165, 29	233, 17	369, 12	874, 6	217, 27	306, 17	435, 11	1060, 6
1.70	210, 36	298, 21	453, 14	1208, 8	273, 33	391, 21	574, 14	1466, 8
1.60	270, 45	397, 27	609, 18	1615, 10	357, 42	506, 26	772, 18	1961, 10
1.50	365, 59	552, 36	854, 24	2260, 13	491, 56	709, 35	1083, 24	2744, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.06$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	8, 3	6, 1	7, 1	5, 0	7, 2	6, 1	8, 1	6, 0
9.50	8, 3	6, 1	7, 1	6, 0	8, 2	7, 1	8, 1	7, 0
9.00	8, 3	6, 1	8, 1	6, 0	8, 2	7, 1	9, 1	7, 0
8.50	9, 3	6, 1	8, 1	7, 0	8, 2	7, 1	9, 1	8, 0
8.00	9, 3	9, 2	9, 1	8, 0	8, 2	11, 2	10, 1	9, 0
7.50	9, 3	10, 2	9, 1	9, 0	11, 3	12, 2	11, 1	10, 0
7.00	12, 4	10, 2	10, 1	17, 1	12, 3	12, 2	12, 1	20, 1
6.50	12, 4	11, 2	11, 1	19, 1	12, 3	13, 2	13, 1	23, 1
6.00	13, 4	12, 2	12, 1	22, 1	13, 3	14, 2	14, 1	26, 1
5.50	13, 4	13, 2	13, 1	26, 1	17, 4	16, 2	16, 1	31, 1
5.00	16, 5	18, 3	21, 2	31, 1	18, 4	17, 2	25, 2	37, 1
4.75	17, 5	19, 3	22, 2	34, 1	22, 5	23, 3	27, 2	41, 1

Table 1 (Continued)

$R=\mu_0/\mu_1$	$t/\mu_0=0.06$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
4.50	18, 5	20, 3	24, 2	38, 1	23, 5	25, 3	29, 2	45, 1
4.25	18, 5	21, 3	26, 2	42, 1	24, 5	26, 3	31, 2	50, 1
4.00	22, 6	22, 3	28, 2	47, 1	25, 5	28, 3	34, 2	57, 1
3.75	25, 7	28, 4	30, 2	54, 1	30, 6	36, 4	37, 2	64, 1
3.50	27, 7	31, 4	42, 3	61, 1	31, 6	39, 4	52, 3	73, 1
3.25	31, 8	38, 5	46, 3	97, 2	37, 7	42, 4	57, 3	116, 2
3.00	36, 9	42, 5	52, 3	113, 2	44, 8	53, 5	64, 3	136, 2
2.75	45, 11	52, 6	70, 4	134, 2	56, 10	67, 6	87, 4	161, 2
2.50	56, 13	65, 7	92, 5	202, 3	70, 12	84, 7	116, 5	244, 3
2.25	72, 16	88, 9	122, 6	249, 3	92, 15	114, 9	153, 6	301, 3
2.00	103, 22	135, 13	178, 8	435, 5	130, 20	164, 12	224, 8	527, 5
1.90	120, 25	160, 15	227, 10	482, 5	153, 23	197, 14	286, 10	584, 5
1.80	142, 29	189, 17	283, 12	609, 6	191, 28	247, 17	357, 12	738, 6
1.70	185, 37	242, 21	348, 14	842, 8	238, 34	315, 21	439, 14	1020, 8
1.60	237, 46	322, 27	468, 18	1125, 10	303, 42	407, 26	591, 18	1364, 10
1.50	323, 61	446, 36	656, 24	1574, 13	424, 57	570, 35	829, 24	1909, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.07$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	7, 3	5, 1	6, 1	4, 0	7, 2	6, 1	7, 1	5, 0
9.50	8, 3	5, 1	6, 1	5, 0	7, 2	6, 1	7, 1	5, 0
9.00	8, 3	5, 1	6, 1	5, 0	7, 2	6, 1	7, 1	6, 0
8.50	8, 3	8, 2	7, 1	6, 0	7, 2	6, 1	8, 1	6, 0
8.00	8, 3	8, 2	7, 1	6, 0	10, 3	10, 2	8, 1	7, 0
7.50	8, 3	9, 2	8, 1	12, 1	10, 3	10, 2	9, 1	8, 0
7.00	11, 4	9, 2	8, 1	13, 1	11, 3	11, 2	10, 1	15, 1
6.50	11, 4	10, 2	9, 1	15, 1	11, 3	12, 2	11, 1	17, 1
6.00	12, 4	10, 2	10, 1	17, 1	14, 4	12, 2	12, 1	20, 1
5.50	12, 4	11, 2	11, 1	20, 1	15, 4	14, 2	13, 1	23, 1
5.00	15, 5	15, 3	17, 2	23, 1	16, 4	15, 2	21, 2	28, 1
4.75	15, 5	16, 3	18, 2	26, 1	19, 5	20, 3	22, 2	30, 1
4.50	18, 6	17, 3	20, 2	28, 1	20, 5	21, 3	24, 2	34, 1
4.25	19, 6	18, 3	21, 2	32, 1	21, 5	22, 3	25, 2	38, 1
4.00	22, 7	19, 3	23, 2	35, 1	25, 6	24, 3	28, 2	42, 1
3.75	23, 7	24, 4	25, 2	40, 1	26, 6	30, 4	30, 2	48, 1
3.50	27, 8	26, 4	34, 3	45, 1	31, 7	33, 4	42, 3	54, 1
3.25	28, 8	33, 5	38, 3	72, 2	33, 7	35, 4	46, 3	86, 2
3.00	32, 9	36, 5	50, 4	84, 2	43, 9	45, 5	52, 3	101, 2
2.75	40, 11	44, 6	56, 4	99, 2	50, 10	56, 6	70, 4	119, 2
2.50	53, 14	61, 8	75, 5	150, 3	62, 12	70, 7	93, 5	180, 3
2.25	67, 17	81, 10	98, 6	184, 3	81, 15	96, 9	123, 6	222, 3
2.00	91, 22	113, 13	156, 9	322, 5	114, 20	137, 12	179, 8	389, 5
1.90	110, 26	135, 15	182, 10	356, 5	134, 23	165, 14	229, 10	430, 5
1.80	134, 31	167, 18	227, 12	449, 6	167, 28	206, 17	286, 12	544, 6
1.70	164, 37	211, 22	279, 14	621, 8	208, 34	263, 21	351, 14	752, 8
1.60	213, 47	270, 27	375, 18	829, 10	271, 43	351, 27	472, 18	1005, 10
1.50	289, 62	383, 37	525, 24	1160, 13	376, 58	475, 35	662, 24	1406, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.08$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	7, 3	6, 2	5, 1	4, 0	6, 2	5, 1	6, 1	4, 0
9.50	7, 3	7, 2	5, 1	4, 0	6, 2	5, 1	6, 1	4, 0
9.00	7, 3	7, 2	6, 1	4, 0	8, 3	8, 2	6, 1	5, 0
8.50	7, 3	7, 2	6, 1	5, 0	9, 3	8, 2	7, 1	5, 0

Table 1 (Continued)

$R=\mu_0/\mu_1$	$t/\mu_0=0.08$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
8.00	9, 4	7, 2	6, 1	5, 0	9, 3	9, 2	7, 1	6, 0
7.50	10, 4	8, 2	7, 1	5, 0	9, 3	9, 2	8, 1	6, 0
7.00	10, 4	8, 2	7, 1	11, 1	10, 3	10, 2	8, 1	12, 1
6.50	10, 4	9, 2	8, 1	12, 1	10, 3	10, 2	9, 1	14, 1
6.00	13, 5	9, 2	9, 1	14, 1	13, 4	11, 2	10, 1	16, 1
5.50	13, 5	10, 2	9, 1	16, 1	14, 4	12, 2	11, 1	18, 1
5.00	14, 5	14, 3	15, 2	18, 1	17, 5	16, 3	17, 2	22, 1
4.75	14, 5	14, 3	16, 2	20, 1	18, 5	17, 3	19, 2	24, 1
4.50	17, 6	15, 3	17, 2	22, 1	18, 5	18, 3	20, 2	26, 1
4.25	17, 6	16, 3	18, 2	25, 1	19, 5	19, 3	21, 2	29, 1
4.00	20, 7	20, 4	19, 2	28, 1	23, 6	21, 3	23, 2	33, 1
3.75	21, 7	21, 4	26, 3	31, 1	24, 6	26, 4	25, 2	37, 1
3.50	24, 8	23, 4	29, 3	35, 1	28, 7	28, 4	35, 3	42, 1
3.25	28, 9	29, 5	31, 3	56, 2	33, 8	36, 5	38, 3	67, 2
3.00	32, 10	31, 5	42, 4	65, 2	38, 9	39, 5	43, 3	78, 2
2.75	39, 12	39, 6	47, 4	77, 2	45, 10	49, 6	58, 4	92, 2
2.50	48, 14	53, 8	62, 5	116, 3	56, 12	61, 7	77, 5	139, 3
2.25	61, 17	70, 10	82, 6	142, 3	77, 16	82, 9	101, 6	171, 3
2.00	86, 23	98, 13	130, 9	248, 5	106, 21	126, 13	148, 8	299, 5
1.90	99, 26	117, 15	151, 10	274, 5	125, 24	150, 15	189, 10	331, 5
1.80	124, 32	144, 18	188, 12	346, 6	149, 28	177, 17	236, 12	418, 6
1.70	151, 38	182, 22	231, 14	477, 8	191, 35	226, 21	290, 14	577, 8
1.60	196, 48	240, 28	310, 18	638, 10	247, 44	301, 27	389, 18	772, 10
1.50	268, 64	330, 37	449, 25	946, 14	340, 59	417, 36	545, 24	1079, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.09$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	7, 3	6, 2	5, 1	3, 0	7, 3	5, 1	5, 1	3, 0
9.50	7, 3	6, 2	5, 1	3, 0	8, 3	5, 1	5, 1	4, 0
9.00	7, 3	6, 2	5, 1	4, 0	8, 3	5, 1	6, 1	4, 0
8.50	7, 3	7, 2	5, 1	4, 0	8, 3	5, 1	6, 1	4, 0
8.00	7, 3	7, 2	6, 1	4, 0	8, 3	8, 2	6, 1	5, 0
7.50	7, 3	7, 2	6, 1	8, 1	9, 3	8, 2	7, 1	5, 0
7.00	9, 4	8, 2	6, 1	9, 1	9, 3	9, 2	7, 1	10, 1
6.50	10, 4	8, 2	7, 1	10, 1	9, 3	9, 2	8, 1	11, 1
6.00	10, 4	8, 2	10, 2	11, 1	12, 4	10, 2	9, 1	13, 1
5.50	12, 5	11, 3	12, 2	13, 1	13, 4	11, 2	13, 2	15, 1
5.00	13, 5	12, 3	13, 2	15, 1	13, 4	15, 3	15, 2	18, 1
4.75	13, 5	13, 3	14, 2	16, 1	16, 5	15, 3	16, 2	19, 1
4.50	16, 6	14, 3	14, 2	18, 1	17, 5	16, 3	17, 2	21, 1
4.25	16, 6	14, 3	15, 2	20, 1	20, 6	17, 3	18, 2	24, 1
4.00	19, 7	18, 4	17, 2	22, 1	21, 6	18, 3	20, 2	26, 1
3.75	22, 8	19, 4	23, 3	25, 1	22, 6	23, 4	22, 2	30, 1
3.50	23, 8	20, 4	25, 3	28, 1	26, 7	25, 4	30, 3	34, 1
3.25	26, 9	26, 5	27, 3	45, 2	30, 8	32, 5	33, 3	53, 2
3.00	30, 10	31, 6	36, 4	52, 2	35, 9	34, 5	44, 4	62, 2
2.75	37, 12	34, 6	40, 4	61, 2	41, 10	43, 6	49, 4	73, 2
2.50	44, 14	47, 8	53, 5	92, 3	54, 13	53, 7	65, 5	111, 3
2.25	59, 18	62, 10	78, 7	113, 3	66, 15	72, 9	86, 6	136, 3
2.00	82, 24	86, 13	110, 9	197, 5	97, 21	110, 13	125, 8	237, 5
1.90	94, 27	103, 15	128, 10	218, 5	113, 24	131, 15	160, 10	262, 5
1.80	114, 32	127, 18	160, 12	307, 7	140, 29	155, 17	199, 12	331, 6
1.70	142, 39	160, 22	208, 15	379, 8	173, 35	197, 21	245, 14	458, 8
1.60	186, 50	211, 28	275, 19	506, 10	223, 44	263, 27	329, 18	612, 10

Table 1 (Continued)

$R=\mu_0/\mu_1$	$t/\mu_0=0.09$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
1.50	248, 65	289, 37	381, 25	750, 14	308, 59	364, 36	460, 24	855, 13
$R=\mu_0/\mu_1$	$t/\mu_0=0.10$							
	$\delta=1.5$				$\delta=2.0$			
	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$	$\eta=1.0$	$\eta=1.25$	$\eta=1.5$	$\eta=2.0$
10.00	6, 3	6, 2	4, 1	3, 0	7, 3	4, 1	5, 1	3, 0
9.50	8, 4	6, 2	4, 1	3, 0	7, 3	4, 1	5, 1	3, 0
9.00	8, 4	6, 2	5, 1	3, 0	7, 3	7, 2	5, 1	3, 0
8.50	8, 4	6, 2	5, 1	3, 0	8, 3	7, 2	5, 1	4, 0
8.00	8, 4	6, 2	5, 1	6, 1	8, 3	7, 2	6, 1	4, 0
7.50	9, 4	7, 2	5, 1	7, 1	8, 3	7, 2	6, 1	4, 0
7.00	9, 4	7, 2	6, 1	8, 1	10, 4	8, 2	7, 1	8, 1
6.50	9, 4	7, 2	6, 1	8, 1	11, 4	8, 2	7, 1	9, 1
6.00	11, 5	10, 3	9, 2	9, 1	11, 4	9, 2	8, 1	11, 1
5.50	12, 5	11, 3	10, 2	11, 1	12, 4	10, 2	12, 2	12, 1
5.00	12, 5	11, 3	11, 2	13, 1	15, 5	13, 3	13, 2	15, 1
4.75	14, 6	12, 3	12, 2	14, 1	15, 5	14, 3	14, 2	16, 1
4.50	15, 6	12, 3	13, 2	15, 1	16, 5	15, 3	15, 2	18, 1
4.25	15, 6	13, 3	14, 2	17, 1	16, 5	16, 3	16, 2	19, 1
4.00	18, 7	17, 4	15, 2	18, 1	19, 6	16, 3	17, 2	22, 1
3.75	18, 7	17, 4	20, 3	21, 1	20, 6	21, 4	19, 2	24, 1
3.50	21, 8	22, 5	22, 3	23, 1	24, 7	23, 4	26, 3	28, 1
3.25	24, 9	23, 5	24, 3	37, 2	28, 8	28, 5	29, 3	44, 2
3.00	30, 11	28, 6	31, 4	43, 2	32, 9	31, 5	38, 4	51, 2
2.75	34, 12	35, 7	35, 4	50, 2	41, 11	38, 6	43, 4	60, 2
2.50	41, 14	42, 8	46, 5	75, 3	50, 13	53, 8	57, 5	90, 3
2.25	55, 18	56, 10	60, 6	92, 3	64, 16	64, 9	74, 6	111, 3
2.00	76, 24	77, 13	96, 9	161, 5	89, 21	98, 13	118, 9	193, 5
1.90	87, 27	97, 16	111, 10	177, 5	108, 25	117, 15	138, 10	214, 5
1.80	108, 33	113, 18	138, 12	250, 7	128, 29	137, 17	172, 12	270, 6
1.70	134, 40	148, 23	179, 15	309, 8	163, 36	175, 21	211, 14	372, 8
1.60	172, 50	194, 29	238, 19	412, 10	209, 45	233, 27	283, 18	497, 10
1.50	236, 67	264, 38	328, 25	611, 14	291, 61	323, 36	396, 24	738, 14

The industrial practitioners can adopt this procedure to the life test and can develop the required plans for other choices of shape parameters. The application of proposed plan is discussed under two real life scenarios. Implementation of proposed plan is discussed with the help of numerical illustrations. Application of proposed plan is detailed with the help of simulated data from Burr distribution. The proposed plan is widely applicable in the manufacturing industries, testing of costly or destructive items, life testing for ball bearing, wind-speed data analysis, low-flow analysis, regional flood frequency, survival data, etc.

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