



Standard Practice for Rubber From Synthetic Sources—Sampling¹

This standard is issued under the fixed designation D3896; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice, intended for referee purposes, covers a uniform procedure for sampling lots of solid synthetic rubbers. Raw synthetic rubber generally is marketed in bales or packages of various sizes.

1.2 A procedure for determining the acceptability of lots of synthetic rubber is given. This procedure is based on a variables sampling plan.

1.3 The sample size is based on the assumption of a visually homogeneous material. If obvious heterogeneity exists, the number of samples shall be increased.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ANSI Standard:*

Z1.9 Sampling Procedures and Tables for Inspection by Variables for Percent Defective²

3. Significance and Use

3.1 The sampling plan is intended for referee purposes only in establishing the properties or quality of a lot or shipment of synthetic rubber.

4. Sampling

4.1 *Number of Samples*—The number of samples to be selected to represent the lot shall be determined by the size of the lot as indicated in **Table 1**. A sample bale or package is selected randomly from the lot for each sample required.

¹ This practice is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.23 on Synthetic Rubbers.

Current edition approved June 1, 2016. Published July 2016. Originally approved in 1980. Last previous edition approved in 2011 as D3896–07 (2011). DOI: 10.1520/D3896-07R16.

² Available from the American National Standards Institute, 25 W. 43rd St., 4th Floor, New York, NY 10036.

NOTE 1—The sampling plan is more efficient for large lots. The risk for the producer and consumer decreases as the sample size increases.

4.2 Removal of Test Portions:

4.2.1 *Bales*—From each sample bale selected, cut one 600 to 1500-g test portion of rubber, depending on the tests to be made. Each test portion is tested separately. Cut the test portion through the entire bale, normal to the bale surfaces of the largest area without the use of lubricant. Remove polyethylene film, paper, talc, or other extraneous surface material prior to testing. Unless the test portion is to be tested immediately, place it in an airtight container of not more than twice the volume of the test portion, or wrap it tightly in two layers of aluminum foil until tested.

4.2.2 *Packages*—From each sample package selected, remove between 600 and 1500 g of rubber depending on the tests to be made. The rubber should be selected randomly from the package and should be as free of surface material as practical. Unless the sample is to be tested immediately, place it in an airtight container.

5. Lot Acceptability

5.1 Each property of the lot is evaluated separately. The requirements of these tests are of two types: (1) those having a single limit such as a minimum or maximum and (2) those having double limits, that is, a minimum and a maximum. A quality index is calculated for each property tested, and from this index, an estimate is made of the percent of the lot that is defective. If this percentage does not exceed the allowable values shown in **Table 1**, the lot is considered acceptable.

5.2 Quality Index Calculations:

5.2.1 For a requirement having a maximum limit, calculate the quality index as follows:

$$Q = (U - \bar{X})/S \quad (1)$$

where:

Q = quality index,

U = maximum value permitted by the specification,

\bar{X} = mean of values obtained for the test portion, and

S = standard deviation of the samples.

5.2.2 For a requirement having a minimum limit, calculate the quality index as follows:

$$Q = (\bar{X} - L)/S \quad (2)$$

TABLE 1 Sampling Plan

NOTE 1—The sampling plan is based on Inspection Level III, ANSI Z1.9, and an Acceptable Quality Level of 2.5 %.

Lot Size, kg (lb)	Number of Samples	Q Value, min ^A	Allowable Percent Defective, max ^B
300 to 4000 (660 to 8800)	3	1.12	7.6
4001 to 6500 (8801 to 14 300)	4	1.17	10.9
6501 to 10 100 (14 301 to 24 200)	5	1.24	9.8
10 001 to 18 000 (24 201 to 39 700)	7	1.33	8.4
18 001 to 30 000 (39 701 to 66 100)	10	1.41	7.3
30 001 to 50 000 (66 101 to 110 200)	15	1.47	6.6
50 001 to 80 000 (110 201 to 176 400)	20	1.51	6.2

^A Minimum value of Q for quality characteristics having single specification limit.
^B Maximum allowable percent defective for quality characteristics having both upper and lower specification limit.

where:

Q, \bar{X} , and S = same as those for maximum value, and
L = minimum value permitted by the specification.

5.3 Acceptability:

5.3.1 For a quality characteristic having a single specification limit, a lot is acceptable if the quality index equals or exceeds the minimum quality index shown in Table 1 for the applicable lot and sample size.

5.3.2 For a quality characteristic having both an upper and lower specification limit, estimate the percentages of the lot above the upper limit and below the lower limit from Table 2 using the appropriate sample size and quality index values calculated in 5.2. A lot is acceptable if the sum of the two percentages does not exceed the maximum allowable percent defective shown in Table 1 for the lot size being evaluated.

6. Precision and Bias

6.1 Precision and bias statements are not directly applicable to this sampling practice, but they are pertinent to individual test methods that will use this sampling practice.

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; http://www.copyright.com/

TABLE 2 Estimate of Lot Percent Defective

Number of Samples:	3	4	5	7	10	15	20
	Estimated Percent of Lot Above or Below Limit						
Q Value	0.95	19.3	18.3	17.9	17.5	17.3	17.2
1.00	16.7	16.7	16.4	16.1	16.0	15.9	15.9
1.05	13.7	15.0	14.9	14.8	14.7	14.7	14.7
1.10	9.8	13.3	13.5	13.5	13.5	13.5	13.5
1.15	0.3	11.7	12.1	12.3	12.3	12.4	12.4
1.20	...	10.0	10.8	11.1	11.2	11.3	11.4
1.25	...	8.7	9.7	10.2	10.4	10.5	10.6
1.30	...	6.7	8.2	8.9	9.2	9.4	9.5
1.35	...	5.0	7.0	7.9	8.3	8.5	8.6
1.40	...	3.3	5.9	7.0	7.4	7.7	7.8
1.45	...	1.7	4.8	6.1	6.6	6.9	7.0
1.50	3.8	5.3	5.9	6.2	6.3
1.55	2.9	4.5	5.2	5.5	5.7
1.60	2.0	3.8	4.5	4.9	5.1
1.65	1.3	3.2	4.0	4.4	4.5
1.70	0.7	2.6	3.4	3.8	4.0
1.75	0.2	2.1	2.9	3.4	3.6
1.80	1.7	2.5	2.9	3.1
1.85	1.3	2.1	2.6	2.8
1.90	0.9	1.8	2.2	2.4
1.95	0.6	1.4	1.9	2.1
2.00	0.4	1.2	1.6	1.8
2.10	0.1	0.7	1.2	1.3
2.20	0.4	0.8	1.0
2.30	0.2	0.5	0.7
2.40	0.1	0.3	0.5
2.50	0.2	0.3
2.60	0.1	0.2
2.70	0.1	0.1
2.80	0.1
2.90

7. Keywords

7.1 sampling; synthetic rubber