



Standard Practice for Sampling and Judging Quality of Solid Electrical Insulating Materials¹

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1. Scope

1.1 This practice covers procedures for obtaining data pertaining to the quality of a lot of electrical insulating material and for making a judgement whether the lot meets the requirements of a material specification.

1.2 This practice is not intended to define a producer's internal quality control procedures but is designed to determine the acceptability of all, or some portion, of a quantity of electrical insulating material that is available for inspection by the user of the material.

1.3 This practice is intended to be used in conjunction with an existing material specification that specifies property characteristic limits, acceptable quality level (AQL), standard test methods, and specific sampling instructions.

1.4 In the absence of a specification as described in 1.3, this practice may be used as a guide, after establishment of agreed-upon property characteristics, limits, AQL, standard test methods, and specific sampling instructions.

1.5 It is intended that this be a practice for inspection by attributes.

1.6 *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 ASTM Standards:

E 300 Practice for Sampling Industrial Chemicals²

2.2 Military Standard:

MIL-STD-105D Sampling Procedures and Tables for Inspection by Attributes³

2.3 Other Document:

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² *Annual Book of ASTM Standards*, Vol 15.05.

³ Available from the U.S. Government Printing Office, Superintendent of Documents, 732 North Capitol Street, NW, Mail Stop: SDE, Washington, D.C. 20401.

ANSI/ASQC A2 -1987⁴

3. Terminology

3.1 Definitions:

3.1.1 *acceptance number, n*—the maximum allowable number of nonconformities for a given AQL and sample size (lot-sample size).

3.1.2 *acceptable quality level (AQL), n*— the maximum percent nonconforming which, for purposes of sampling inspection, is considered satisfactory as a process average.

3.1.3 *critical property, n*—a quantitatively measurable characteristic which is absolutely necessary to be met if a material or product is to provide satisfactory performance for the intended use.

3.1.3.1 *Discussion*—In some situations, specification requirements coincide with customer usage requirements. In other situations, they may not coincide, being either more or less stringent. More stringent sampling (for example, smaller AQL values) is usually used for measurement of characteristics which are considered critical. The selection of sampling plans is independent of whether the term *defect* or *nonconformity* is appropriate.

3.1.4 *defect, n*—a departure of a quality characteristic from its intended level, or state, that occurs with a severity sufficient to cause an associated product or service not to satisfy intended normal, or reasonably foreseeable, usage requirements.

3.1.4.1 *Discussion*—The terms *defect* and *nonconformity* and their derivatives are used somewhat interchangeably in the historical and current literature. *Nonconformity* objectively describes the comparison of test results to specification requirements, while the term *defect* has a connotation of predicting the failure of a product or service to perform its intended function in use. Since this latter connotation is often unintended, the term *nonconformity* is preferred in full consensus standards. The selection of any sample plan is independent of whether the term *defect* or *nonconformity* is appropriate.

The term *defect* may be appropriate for specifications mutually agreed upon by a producer and a user where specific use conditions are

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036 or American Society for Quality Control, 310 W. Wisconsin Ave., Milwaukee, WI 53203.

clearly understood. Even in these cases however, use the term *defect* with caution and consider substituting the term *nonconformity*.

For additional comments, see ANSI/ASQC A2-1987 that also states: "When a quality characteristic of a product or service is "evaluated" in terms of conformance to specification requirements, the use of the term *nonconformity* is appropriate."

3.1.5 *group AQL*—the AQL assigned to a group of material properties.

3.1.5.1 *Discussion*—See 5.2 for additional information about the meaning of AQL.

3.1.6 *lot, n*—an entity of electrical insulating material or product which, insofar as is practicable, consists of a single type, grade, class, size, or composition that was manufactured under essentially the same conditions and is available to the user for sampling at one time.

3.1.7 *lot number, n*—the number used by a producer to identify an entity of electrical insulating material or product.

3.1.8 *major property, n*—a quantitatively measurable characteristic which, if not met, is likely to seriously impair the performance of a material or product for the intended use.

3.1.8.1 *Discussion*—In some situations, specification requirements coincide with customer usage requirements. In other situations, they may not coincide, being either more or less stringent. More stringent sampling (for example, smaller AQL values) is usually used for measurement of characteristics that are considered important. The selection of sampling plans is independent of whether the term *defect* or *nonconformity* is appropriate.

3.1.9 *minor property, n*—a characteristic which, if not met, is not likely to materially reduce the performance of a material or product for the intended use.

3.1.9.1 *Discussion*—In some situations, specification requirements coincide with customer usage requirements. In other situations, they may not coincide, being either more or less stringent. More stringent sampling (for example, smaller AQL values) is usually used for measurement of characteristics that are considered important. The selection of sampling plans is independent of whether the term *defect* or *nonconformity* is appropriate.

3.1.10 *nonconforming unit, n*—a unit of product containing at least one nonconformity.

3.1.11 *nonconformities per hundred units, n*— a calculated ratio of nonconforming units to the number of units inspected, the quotient being multiplied by 100 (See 3.1.13.)

3.1.12 *nonconformity, n*—a departure of a quality characteristic from its intended level or state that occurs with a severity sufficient to cause a test result not to meet a specification requirement.

3.1.13 *percent nonconforming, n*—a calculated ratio of nonconforming units to the number of units inspected, the quotient being multiplied by 100.

3.1.14 *rejection number, n*—the minimum number of nonconformities for a given AQL and sample size (lot-sample size) which will subject a lot to rejection.

3.1.15 *sample, n*—one or more units of product taken from a lot without regard to the quality of the unit. (Also often termed lot sample).

3.1.16 *sample size, n*—the number of units of product taken to make up the sample.

3.1.16.1 *Discussion*—This standard uses only lot sample sizes and not lot sizes since the discriminatory power of any sampling plan is independent essentially of the size of the lot. The sample size selected by the user for a given acceptable quality level (AQL) is optional depending upon the degree of protection desired by the user against the acceptance of nonconforming lots.

3.1.17 *test measurement, n*—a quantitative expression of one value determined for a property of interest by a single application of a specified test procedure.

3.1.18 *test result, n*—the value that expresses the level of a property of the test unit.

3.1.18.1 *Discussion*—A test result may sometimes be a single test measurement but usually a test result is computed from several test measurements.

3.1.19 *test specimen, n*—a portion of a test unit upon which one or more test measurements are made.

3.1.20 *test unit, n*—a fraction of a unit of product from which one or more test specimens are taken for each property.

3.1.20.1 *Discussion*—If the unit of product is of insufficient size to meet the requirements of a testing method: (1) sample adjacent units of product and aggregate units of product for the test unit or, (2) obtain a test unit of sufficient size, and representative of the unit of product, from the producer.

3.1.21 *unit of product, n*—an entity of electrical insulating material or product for inspection to determine its classification as conforming or non-conforming.

3.1.21.1 *Discussion*—A unit of product is established by the user and may or may not be the same as a unit of purchase, supply, production, or shipment. Some examples of a unit of product are:

Bag	Case	Reel
Barrel	Container	Roll
Bin	Cop	Sheet
Bobbin	Drum	Skid
Box	Length	Spool
Bundle	Pad	Tank
Car	Pail	Tank compartment
Carton	Pallet	Truckload

4. Summary of Practice

4.1 Instructions are given for obtaining a sample from which specimens are then taken for testing. The test data are compared to the material specification and a judgement is then made as to whether the material meets the requirements of said material specification.

4.2 This practice has been modeled after MIL-STD105D.

5. Procedure

5.1 General Considerations:

5.1.1 Assemble the lot of electrical insulating material so that a lot sample may be obtained in a manner that will minimize bias in the selection of the units of product that will be inspected. A scheme that offers a good chance of minimizing bias is the assignment of numbers to each unit of product and then using a table of random numbers to select those units of product from which test units are taken.

5.1.2 For a lot of electrical insulating material which is in bulk form (for example, a tank car of powdered resin) take the lot sample from the unit of product in accordance with Practice E 300.

5.1.3 Take the material to be removed from any unit of product in a random manner. It will sometimes be impracticable to meet this requirement (for example, in the case of long lengths of material wound onto rolls or large, thick, heavy sheets packed on pallets or skids). In such situations economy will dictate the removal of material from the end of a roll, or the top of a pile, etc. in which cases the selection cannot be described as “random.”

5.1.4 Take the necessary amount of material from the test unit so as to meet the specimen requirements of the various test methods that will be used to evaluate the material.

5.1.5 Refer to the material specification for the allowable maximum elapsed time between the assembly of the lot for inspection and the disposition of the lot. If the material specification (or other pertinent document) does not cover this matter, the maximum allowable time is 30 calendar days.

5.1.6 Exercise care to protect the electrical insulating material contained in the test unit from which specimens are to be prepared. This protection may take the form of packaging in metal foil or glass containers so as to prevent or minimize contamination of the material from the effects of the environment to which such material is subjected between sampling and testing.

5.1.7 Test units assembled as described above shall be deemed to be representative of the lot of material being inspected. Disposition of the lot, or portions thereof will be based upon the data generated from these test units unless otherwise agreed upon between the user and the producer.

5.2 Establishing Acceptable Quality Levels:

5.2.1 Acceptable quality levels (AQL’s) for each critical, major, and minor property shall be as mutually agreed upon by the producer and the user. Group AQL’s for given groups of properties may likewise be established. These AQL’s may be disclosed in a purchase order, material specification, or in some other document. This standard is not intended to impose limits upon the risks acceptable to either the user or the producer.

5.2.2 When a user designates some specific value of AQL for a single nonconformity, it indicates that the user’s acceptance sampling plan will accept the great majority of the lots submitted by the producer if the process average level of percent nonconforming in the lots is no greater than the designated value of AQL. The preceding statement is also true for a group AQL value designated for a group of nonconformities.

5.2.2.1 The sampling plans of this standard are so arranged that the probability of acceptance, at the designated AQL value, depends upon the sample size. For a given AQL, the probability of acceptance will be generally higher for large sample sizes than for small sample sizes. The AQL alone does not describe the user protection for individual lots, but more directly relates to what a user might expect from a series of lots. Refer to the operating characteristic curve to determine what protection the user will have for a specific AQL.

5.2.3 The designation of an AQL shall not imply that a producer has the right to knowingly supply any nonconforming unit of product.

5.2.4 The values of AQL listed in the accompanying tables (see Section 8) are known as preferred AQL’s. If any AQL is designated other than a preferred AQL, these tables are not applicable.

5.3 Sampling Plan Selection:

5.3.1 Use the designated AQL and the sample size code letter from Table 1 to select a sampling plan from Tables 2-22. When no sampling plan is available for a given combination of AQL and code letter, the table directs the user to a different code letter. Use the sample size given by the new code letter, not the original code letter.

5.3.1.1 This procedure may lead to different sample sizes for different classes of nonconformities. In such cases the user of the electrical insulating material may designate and authorize, for all classes of nonconformities, the selection and use of the code letter corresponding to the largest sample size derived.

TABLE 1 Sample Size Code Letters (See 5.4)

Lot or batch size			Special inspection levels				General inspection levels		
			S-1	S-2	S-3	S-4	I	II	III
2	to	8	A	A	A	A	A	B	
9	to	15	A	A	A	A	A	C	
16	to	25	A	A	B	B	B	D	
26	to	50	A	B	B	C	C	E	
51	to	90	B	B	C	C	C	F	
91	to	150	B	B	C	D	D	G	
151	to	280	B	C	D	E	E	H	
281	to	500	B	C	D	E	F	J	
501	to	1200	C	C	E	F	G	K	
1201	to	3200	C	D	E	G	H	L	
3201	to	10000	C	D	F	G	J	M	
10001	to	35000	C	D	F	H	K	N	
35001	to	150000	D	E	G	J	L	P	
150001	to	500000	D	E	G	J	M	Q	
500001	and over		D	E	H	K	N	R	

5.3.1.2 As an alternative to a single sampling plan with an acceptance number of 0, the plan with an acceptance number of 1 with its correspondingly larger sample size for a designated AQL (where available) may be used when designated and approved by the user.

5.3.2 *Types of Sampling Plans*—Three types of sampling plans: single, double, and multiple are given in Table 2, Table 3, and Table 4, respectively. When several types of plans are available for a given AQL and code letter, any one may be used. A decision as to type of plan, either single, double, or multiple, when available for a given AQL and code letter, will usually be based upon the comparison between the administrative difficulty and the average sample sizes of the available plans. The average sample size of multiple plans is less than for double (except in the case corresponding to single acceptance number 1) and both of these are always less than a single sample size. Usually the administrative difficulty for single sampling and the cost per unit of the sample are less than for double or multiple.

5.3.3 *Single Sampling Plans*—From any lot, inspect that number of units which equals the sample size given by the plan.

5.3.3.1 Consider any lot acceptable if the number of nonconformities found in the sample is equal to, or less than, the acceptance number.

5.3.3.2 Consider any lot rejectable if the number of nonconformities found in the sample is equal to, or greater than, the rejection number.

5.3.4 *Double Sampling Plans*—From any lot, inspect that number of units which equals the sample size given by the plan.

5.3.4.1 Consider any lot acceptable if the number of nonconformities found in the first sample is equal to, or less than, the first acceptance number.

5.3.4.2 Consider any lot rejectable if the number of nonconformities found in the first sample is equal to, or greater than, the first rejection number.

5.3.4.3 If the number of nonconformities in the first sample lies between the first acceptance and rejection numbers, inspect a second sample of the size given by the plan.

5.3.4.4 Accumulate the number of nonconformities found in the first and the second samples.

5.3.4.5 Consider any lot acceptable if the cumulative number of nonconformities found in the sample is equal to, or less than, the second acceptance number.

5.3.4.6 Consider any lot rejectable if the cumulative number of nonconformities found in the sample is equal to, or greater than, the second rejection number.

5.3.5 *Multiple Sampling Plans*—Use the procedure of 5.3.4 for multiple sampling plans but the number of successive samples required to reach a decision will be more than two.

5.3.6 *Special Procedure for Reduced Inspection*—Under reduced inspection, the sampling procedure may terminate without either acceptance or rejection criteria having been met. In these circumstances, the lot will be considered acceptable, but normal inspection will be reinstated starting with the next lot, submitted to the user.

5.4 *Inspection Levels:*

5.4.1 The inspection level determines the relationship between the lot size and the sample size. The inspection level to be used for any particular requirement will be prescribed by the user. Three inspection levels: I, II, and III, are given in Table 1 for general use. Unless otherwise specified, Inspection Level II will be used. However, Inspection Level I may be specified when less discrimination is needed, or Level III may be specified for greater discrimination. Four additional special levels: S-1, S-2, S-3 and S-4, are given in the same table and may be used where relatively small sample sizes are necessary and large sampling risks can or must be tolerated.

NOTE 1—In the designation of inspection levels S-1 to S-4, care must be exercised to avoid AQLs inconsistent with these inspection levels.

5.4.2 *Code Letters*—Sample sizes are designated by code letters. Use Table 1 to find the applicable code letter for the particular lot size and the prescribed inspection level.

5.4.3 *Initiation of Inspection*—Use normal inspection at the start of inspection unless otherwise directed by the user.

5.4.4 *Continuation of Inspection*—Continue normal, tightened, or reduced inspection unchanged for each class of nonconformities on successive lots except where the switching procedures described in 5.4.5 to 5.4.5.4 require change.

5.4.5 *Switching Procedures*—Apply switching procedures in 5.4.5.1 to 5.4.5.4 independently to each class of nonconformity.

5.4.5.1 *Normal to Tightened*—When normal inspection is in effect, institute tightened inspection when two out of five consecutive lots have been rejected after original inspection. Do not count among the five any lots that were resubmitted for inspection (see also 6.4).

5.4.5.2 *Tightened to Normal*—When tightened inspection is in effect, institute normal inspection after five consecutive lots have been considered acceptable after original inspection.

5.4.5.3 *Normal to Reduced*—When normal inspection is in effect, institute reduced inspection only if conformance with each of the four following criteria exists: (1) The preceding 10 lots (or more, as indicated by the note to Table 5) have been on normal inspection and none have been rejected after original inspection. (2) The total number of nonconformities in the samples from the preceding ten lots (or such other number as indicated by 1 > above) is equal to, or less than, the applicable number given in Table 5. If double or multiple sampling is in use, include all samples inspected, not “first” samples only. (3) Production is at a steady rate. (4) Reduced inspection is considered desirable by the user.

5.4.5.4 *Reduced to Normal*—When reduced inspection is in effect institute normal if any one of the following occur after original inspection: (1) Any lot is rejected. (2) Any lot is considered acceptable under the procedures of 5.3.6. (3) Production becomes irregular or delayed. (4) Other conditions warrant institution of normal inspection.

5.4.6 *Discontinuation of Inspection*— In the event that ten consecutive lots (or such other number as may be designated by the user) remain on tightened inspection, discontinue the inspection and acceptance of material under the provisions of this standard pending action by the producer to improve the quality of submitted material.

6. Judging Lot Quality

6.1 Acceptance (or rejection) of the lot shall be determined upon the data and other information obtained by the use of a sampling plan or plans associated with the designated AQL or AQL's, and the requirements of the material specification.

6.2 The right is reserved by the user to reject any unit of product found to be nonconforming during inspection. That rejected unit of product need not be one of the units of product comprising the lot sample. The rejection of that unit may occur regardless of the disposition of the lot as a whole. Such rejected units of product may be repaired or corrected and resubmitted for inspection with the approval of, and in the manner specified by, the user.

6.3 For cases of evaluating material or product for critical properties or characteristics, the user may at his discretion inspect every unit of product for critical properties or characteristics. When a nonconformity is found for any critical property or characteristic, the user may immediately reject the entire lot.

6.4 Lots found unacceptable may be resubmitted for reinspection only if all units of product in the lot have been examined and tested and all nonconforming units of product have been either removed therefrom or the nonconformities have been corrected. Only the user determines whether: (1) normal or tightened inspection is applied during this reinspection, and whether (2) all, or particular, types and classes of nonconformities are included in the reinspection.

7. Disposition of the Lot

7.1 If the lot-sample fails to meet the requirements for acceptability as set forth in the material specification, the entire lot shall be subject to rejection and the user shall notify the producer immediately.

7.2 The user shall have the prerogative to waive requirements with respect to the sampling plans, conducting of tests, applicable property specified limits, resampling and lot rejection.

8. Data and Information Generated as a Result of Inspection and Testing

8.1 Inasmuch as the promulgation and dissemination of knowledge is a worthy goal, the data and other pertinent information regarding the quality of any given lot of electrical insulating material should be made available to the producer of the material upon completion of the evaluation of the lot.

9. Sampling Tables

9.1 These sampling tables have been adapted from MIL-STD-105D. The following discussion and references are provided to supplement the user's knowledge of this standard.

9.2 To choose a sampling plan one must know the lot size, the inspection level, the AQL, and the type of sampling to be used which is either single, double, or multiple sampling.

9.2.1 Lot size is the total number of units of product in a lot.

9.2.2 To define the inspection level, see 5.4.1.

9.2.3 The AQL is found in the material specification, purchase order, or other pertinent document. See also 5.2.2.

9.2.4 Types of sampling are discussed in 5.3.2.

9.3 Given the lot size and inspection level (generally Level II unless noted otherwise) a sample size code letter can be found in Table 1.

9.4 The AQL and the sample size code letter is then used to obtain the sampling plan from Table 2, Table 3, and Table 4, which are for single, double or multiple plans, respectively. Generally, a single sampling plan would be used. The sub-Tables 2, 3, and 4 denote the severity of inspection depending upon the quality of previously submitted lots. The levels of severity are noted as normal, tightened and reduced and are listed in Tables sub B, C and D, respectively. The initial sampling plan is generally obtained from the A (normal inspection) Tables. When the quality of submitted lots is consistently good, inspection can be reduced. Reciprocally, when lots are of poor quality, inspection can be tightened. The rules for switching between the three levels of inspection severity can be found in 5.4.5 to 5.4.9.

9.5 Tables 6-22 portray the sampling plans for each sample size code letter. In addition, each Table includes the respective Operating Characteristic Curves and tabulated values for each AQL. These curves show the percent of lots that can be expected to be accepted by each sampling plan depending upon the quality of submitted lots. This is also known as the probability of acceptance.

9.6 Note that all tabular AQL values less than or equal to 10 are expressed in percent nonconforming whereas AQL values greater than 10 are expressed as nonconformities per hundred units.

9.7 A list of references (**1 to 15**)⁵ appears at the end of this standard. It is intended to provide the reader with more specific information and actual situations of application. Although the referenced works cite MIL STD 105D, the references are also applicable to this practice.

10. Keywords

10.1 acceptable quality level (AQL); critical property; electrical insulation; inspection; major property; minor property; nonconformity; nonconforming; quality judgment; sampling; test measurement; test result

⁵ The boldface numbers in parentheses refer to a list of references appended to this practice.

TABLE 2 A Single Sampling Plans For Normal Inspection (Master Table) (See 5.3.1 and 5.3.2)

Sample size code letter	Sample size	Acceptable Quality Levels (normal inspection)																																																			
		0.010		0.015		0.025		0.040		0.065		0.10		0.15		0.25		0.40		0.65		1.0		1.5		2.5		4.0		6.5		10		15		25		40		65		100		150		250		400		650		1000	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re		
A	2	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↓		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31		
B	3	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
C	5	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
D	8	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
E	13	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
F	20	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
G	32	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
H	50	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
J	80	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
K	125	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
L	200	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
M	315	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
N	500	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
P	800	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
Q	1250	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45
R	2000	↑		↑		↑		↑		↑		↑		↑		↑		↑		↓		↓		↓		↓		0	1	↑		↓		1	2	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31	44	45

↓ Use first sampling plan below arrow. If sample size equals, or exceeds, lot or batch size, do 100 percent inspection.
 ↑ Use first sampling plan above arrow.
 Ac = Acceptance number.
 Re = Rejection number.

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TABLE 2 C Single Sampling Plans for Reduced Inspection (Master Table) (See 5.3.1 and 5.3.2)

Sample size code letter	Sample size	Acceptable Quality Levels (reduced inspection) [†]																											
		0.010	0.015	0.025	0.040	0.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5	10	15	25	40	65	100	150	250	400	650	1000		
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	
A	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
B	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
C	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
D	3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
E	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
F	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
G	13	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
H	20	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
J	32	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
K	50	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
L	80	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
M	125	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
N	200	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
P	315	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
Q	500	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
R	800	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑		

↓ Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100 percent inspection. Ac = Acceptance number.
↑ Use first sampling plan above arrow. Re = Rejection number.
† If the acceptance number has been exceeded, but the rejection number has not been reached, accept the lot, but reinstate normal inspection (see 10.1.4).

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TABLE 3 A Double Sampling Plans for Normal Inspection (Master Table) (See 9.4 and 9.5)



Sample size code letter	Sample	Sample size	Cumulative sample size	Acceptable Quality Levels (normal inspection)																																																												
				0.010	0.015	0.025	0.040	0.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5	10	15	25	40	65	100	150	250	400	650	1000																																			
				Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re																	
A				↓																																																												
B	First Second	2 2	2 4																																													0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57							
C	First Second	3 3	3 6																																														0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57						
D	First Second	5 5	5 10																																															0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57					
E	First Second	8 8	8 16																																																0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57				
F	First Second	13 13	13 26																																																0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57				
G	First Second	20 20	20 40																																																0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57				
H	First Second	32 32	32 64																																																0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57				
J	First Second	50 50	50 100																																																	0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57			
K	First Second	80 80	80 160																																																		0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57		
L	First Second	125 125	125 250																																																		0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57		
M	First Second	200 200	200 400																																																			0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57	
N	First Second	315 315	315 630																																																			0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57	
P	First Second	500 500	500 1000																																																				0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57
Q	First Second	800 800	800 1600																																																				0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57
R	First Second	1250 1250	1250 2500																																																				0 2 1 2	0 3 3 4	1 4 4 5	2 5 6 7	3 7 8 9	5 9 11 16	7 11 18 19	11 16 26 27	17 22 37 38	25 31 56 57

- Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100 percent inspection.
- Use first sampling plan above arrow.
- Ac** = Acceptance number
- Re** = Rejection number
- *** = Use corresponding single sampling plan (or alternatively, use double sampling plan below, where available).

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TABLE 3 B Double Sampling Plans for Tightened Inspection (Master Table) (See 9.4 and 9.5)

Sample size code letter	Sample	Sample size	Cumulative sample size	Acceptable Quality Levels (tightened inspection)																															
				0.010	0.015	0.025	0.040	0.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5	10	15	25	40	65	100	150	250	400	650	1000						
				Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re			
A																																			
B	First	2	2																																
	Second	2	3																																
C	First	3	3																																
	Second	3	6																																
D	First	5	5																																
	Second	5	10																																
E	First	8	8																																
	Second	8	16																																
F	First	13	13																																
	Second	13	26																																
G	First	20	20																																
	Second	20	40																																
H	First	32	32																																
	Second	32	64																																
J	First	50	50																																
	Second	50	100																																
K	First	80	80																																
	Second	80	160																																
L	First	125	125																																
	Second	125	250																																
M	First	200	200																																
	Second	200	400																																
N	First	315	315																																
	Second	315	630																																
P	First	500	500																																
	Second	500	1000																																
Q	First	800	800																																
	Second	800	1600																																
R	First	1250	1250																																
	Second	1250	2500																																
S	First	2000	2000																																
	Second	2000	4000																																

-  Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100 percent inspection.
-  Use first sampling plan above arrow.
- Ac = Acceptance number
- Re = Rejection number
- * = Use corresponding single sampling plan (or, alternatively, use double sampling plan below, where available).

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TABLE 3 C Double Sampling Plans for Reduced Inspection (Master Table)

Sample size code letter	Sample	Sample size	Cumulative sample size	Acceptable Quality Levels (reduced inspection) [†]																															
				0.010	0.015	0.025	0.040	0.065	0.10	0.15	0.25	0.40	0.65	1.0	1.5	2.5	4.0	6.5	10	15	25	40	65	100	150	250	400	650	1000						
				Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re			
A				↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
B				↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
C				↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
D	First Second	2 2	2 4	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
E	First Second	3 3	3 6	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
F	First Second	5 5	5 10	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
G	First Second	8 8	8 16	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
H	First Second	13 13	13 26	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
I	First Second	20 20	20 40	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
J	First Second	32 32	32 64	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
K	First Second	50 50	50 100	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
L	First Second	80 80	80 160	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
M	First Second	125 125	125 250	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
N	First Second	200 200	200 400	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
O	First Second	315 315	315 630	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						
P	First Second	500 500	500 1000	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓						

- ⚡ = Use first sampling plan below arrow. If sample size equals or exceeds lot or batch size, do 100 percent inspection.
- ↓ = Use first sampling plan above arrow.
- Ac = Acceptance number.
- Re = Rejection number.
- * = Use corresponding single sampling plan (or alternatively, use double sampling plan below, when available.)
- † = If, after the second sample, the acceptance number has been exceeded, but the rejection number has not been reached, accept the lot, but reinstate normal inspection (see 10.14).

TABLE 4 A Multiple Sampling Plans for Normal Inspection (Master Table) (See 9.4 and 9.5)

Sample size code letter	Sample	Sample size	Cumulative sample size	Acceptable Quality Levels (normal inspection)																																																				
				0.010		0.015		0.025		0.040		0.065		0.10		0.15		0.25		0.40		0.65		1.0		1.5		2.5		4.0		6.5		10		15		25		40		65		100		150		250		400		650		1000		
				Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re					
A	First	2	2	↓	↓																																																			
					B	Second	2	4	↓	↓																																														
										C	Third	2	6	↓	↓																																									
D	First	2	8	↓	↓																																																			
					Second	2	4	↓	↓																																															
									Third	2	6	↓	↓																																											
													Fourth	2	8	↓	↓																																							
																	Fifth	2	10	↓	↓																																			
																					Sixth	2	12	↓	↓																															
																									Seventh	2	14	↓	↓																											
E	First	3	3	↓	↓																																																			
					Second	3	6	↓	↓																																															
									Third	3	9	↓	↓																																											
													Fourth	3	12	↓	↓																																							
																	Fifth	3	15	↓	↓																																			
																					Sixth	3	18	↓	↓																															
																									Seventh	3	21	↓	↓																											
F	First	5	5	↓	↓																																																			
					Second	5	10	↓	↓																																															
									Third	5	15	↓	↓																																											
													Fourth	5	20	↓	↓																																							
																	Fifth	5	25	↓	↓																																			
																					Sixth	5	30	↓	↓																															
																									Seventh	5	35	↓	↓																											
G	First	8	8	↓	↓																																																			
					Second	8	16	↓	↓																																															
									Third	8	24	↓	↓																																											
													Fourth	8	32	↓	↓																																							
																	Fifth	8	40	↓	↓																																			
																					Sixth	8	48	↓	↓																															
																									Seventh	8	56	↓	↓																											
H	First	13	13	↓	↓																																																			
					Second	13	26	↓	↓																																															
									Third	13	39	↓	↓																																											
													Fourth	13	52	↓	↓																																							
																	Fifth	13	65	↓	↓																																			
																					Sixth	13	78	↓	↓																															
																									Seventh	13	91	↓	↓																											
I	First	20	20	↓	↓																																																			
					Second	20	40	↓	↓																																															
									Third	20	60	↓	↓																																											
													Fourth	20	80	↓	↓																																							
																	Fifth	20	100	↓	↓																																			
																					Sixth	20	120	↓	↓																															
																									Seventh	20	140	↓	↓																											

- ↓ = Use first sampling plan below arrow (refer to continuation of table on following page, when necessary). If sample size equals or exceeds lot or batch size, do 100 percent inspection.
- ↑ = Use first sampling plan above arrow.
- Ac = Acceptance number.
- Re = Rejection number.
- *
- ↓↑ = Use corresponding single sampling plan for alternatively, use multiple sampling plan below, where available.
- ↑↓ = Use corresponding double sampling plan for alternatively, use multiple sampling plan below, where available.
- * = Acceptance not permitted at this sample size.

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