**ASTM INTERNATIONAL**

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An American National Standard

# Standard Practice for
# Sampling and Judging Quality of Solid Electrical Insulating Materials[1]

## 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, use this practice 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:*[2]

E300 Practice for Sampling Industrial Chemicals

2.2 *Military Standard:*

MIL-STD-105D Sampling Procedures and Tables for Inspection by Attributes[3]

2.3 *Other Document:*

ANSI/ASQC A2 -1987[4]

## 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

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*A Summary of Changes section appears at the end of this standard

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 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 is sometimes 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-STD-105D.

## 5. Procedure

5.1 *General Considerations:*

5.1.1 Assemble the lot of electrical insulating material so that a lot sample is 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 that 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 E300.

5.1.3 Take the material to be removed from any unit of product in a random manner. When it is 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), 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. An example of this protection is 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. It is also acceptable to establish group AQL's for given groups of properties. Disclose these AQL's 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 Appendix X1) 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.

**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 | A | B |
| 9 | to | 15 | A | A | A | A | A | B | C |
| 16 | to | 25 | A | A | B | B | B | C | D |
| 26 | to | 50 | A | B | B | C | C | D | E |
| 51 | to | 90 | B | B | C | C | C | E | F |
| 91 | to | 150 | B | B | C | D | D | F | G |
| 151 | to | 280 | B | C | D | E | E | G | H |
| 281 | to | 500 | B | C | D | E | F | H | J |
| 501 | to | 1200 | C | C | E | F | G | J | K |
| 1201 | to | 3200 | C | D | E | G | H | K | L |
| 3201 | to | 10 000 | C | D | F | G | J | L | M |
| 10 001 | to | 35 000 | C | D | F | H | K | M | N |
| 35 001 | to | 150 000 | D | E | G | J | L | N | P |
| 150 001 | to | 500 000 | D | E | G | J | M | P | Q |
| 500 001 | and | over | D | E | H | K | N | Q | R |

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

Acceptable Quality Levels (normal inspection). Cell values are shown as "Ac Re". ↓ = Use first sampling plan below arrow. ↑ = Use first sampling plan above arrow.

| Sample size code letter | Sample size | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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.

**TABLE 2 B Single Sampling Plans for Tightened Inspection (Master Table)** *(See 8.4 and 8.5) (continued)*

Acceptable Quality Levels (tightened inspection)

| Sample size code letter | Sample size | 0.010 Ac Re | 0.015 Ac Re | 0.025 Ac Re | 0.040 Ac Re | 0.065 Ac Re | 0.10 Ac Re | 0.15 Ac Re | 0.25 Ac Re | 0.40 Ac Re | 0.65 Ac Re | 1.0 Ac Re | 1.5 Ac Re | 2.5 Ac Re | 4.0 Ac Re | 6.5 Ac Re | 10 Ac Re | 15 Ac Re | 25 Ac Re | 40 Ac Re | 65 Ac Re | 100 Ac Re | 150 Ac Re | 250 Ac Re | 400 Ac Re | 650 Ac Re | 1000 Ac Re |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 2 | | | | | | | | | | | | | | | | | | ⇩ | 1 2 | 2 3 | 3 5 | 5 8 | 8 12 | 12 18 | 18 27 | 27 41 |
| B | 3 | | | | | | | | | | | | | | | | ⇩ | 1 2 | 1 2 | 2 3 | 3 5 | 5 8 | 8 12 | 12 18 | 18 27 | 28 41 | 28 42 |
| C | 5 | | | | | | | | | | | | | | | 0 1 | 1 2 | 2 3 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | 27 28 | 41 42 | 42 |
| D | 8 | | | | | | | | | | | | ⇩ | 0 1 | 0 1 | ⇩ | 2 3 | 3 4 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | 27 28 | 41 42 | | |
| E | 13 | | | | | | | | | | | ⇩ | 0 1 | ⇩ | 1 2 | 1 2 | 3 4 | 5 6 | 5 6 | 8 9 | 12 13 | 18 19 | 27 28 | 41 42 | | | |
| F | 20 | | | | | | | | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 2 3 | 5 6 | 8 9 | 8 9 | 12 13 | 18 19 | 27 | 41 | | | | |
| G | 32 | | | | | | | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 12 13 | 18 19 | | | | | | | |
| H | 50 | | | | | | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | 18 19 | | | | | | | | |
| J | 80 | | | | | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | | | | | | | | | | |
| K | 125 | | | | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | | | | | | | | | | | |
| L | 200 | | | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | ⇧ | | | | | | | | | | | |
| M | 315 | | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | ⇧ | | | | | | | | | | | | |
| N | 500 | | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | ⇧ | | | | | | | | | | | | | |
| P | 800 | | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | ⇧ | | | | | | | | | | | | | | |
| Q | 1250 | ⇩ | 0 1 | ⇩ | 1 2 | 2 3 | 3 4 | 5 6 | 8 9 | 12 13 | 18 19 | ⇧ | | | | | | | | | | | | | | | |
| R | 2000 | 0 1 | ⇩ | 1 2 | 2 | 3 | 4 | 5 | 6 | 9 | 18 19 | ⇧ | | | | | | | | | | | | | | | |
| S | 3150 | 0 1 | | 1 2 | | | | | | | | | | | | | | | | | | | | | | | |

⇩ = 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) (continued)*

Each cell gives "Ac Re" (Acceptance number, Rejection number). ↓ = use first sampling plan below arrow; ↑ = use first sampling plan above arrow.

| 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 |
| A | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 1 2 | 2 3 | 3 4 | 5 6 | 7 8 | 10 11 | 14 15 | 21 22 | 30 31 |
| B | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 2 4 | 3 5 | 5 6 | 7 8 | 10 11 | 14 15 | 21 22 | 30 31 |
| C | 2 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | 14 17 | 21 24 | ↑ |
| D | 3 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | 14 17 | 21 24 | ↑ | ↑ |
| E | 5 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | 14 17 | 21 24 | ↑ | ↑ | ↑ |
| F | 8 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| G | 13 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| H | 20 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| J | 32 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| K | 50 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| L | 80 | ↓ | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| M | 125 | ↓ | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| N | 200 | ↓ | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| P | 315 | ↓ | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| Q | 500 | ↓ | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |
| R | 800 | ↓ | 0 1 | 0 2 | 1 3 | 1 4 | 2 5 | 3 6 | 5 8 | 7 10 | 10 13 | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ | ↑ |

↓ = 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.

† = 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).

**TABLE 3 A Double Sampling Plans for Normal Inspection (Master Table)** *(See 8.4 and 8.5)*

Acceptable Quality Levels (normal inspection)

| Sample size code letter | Sample | Sample size | Cumulative sample size |
|---|---|---|---|
| A | | | |
| B | First | 2 | 2 |
| B | Second | 2 | 4 |
| C | First | 3 | 3 |
| C | Second | 3 | 6 |
| D | First | 5 | 5 |
| D | Second | 5 | 10 |
| E | First | 8 | 8 |
| E | Second | 8 | 16 |
| F | First | 13 | 13 |
| F | Second | 13 | 26 |
| G | First | 20 | 20 |
| G | Second | 20 | 40 |
| H | First | 32 | 32 |
| H | Second | 32 | 64 |
| J | First | 50 | 50 |
| J | Second | 50 | 100 |
| K | First | 80 | 80 |
| K | Second | 80 | 160 |
| L | First | 125 | 125 |
| L | Second | 125 | 250 |
| M | First | 200 | 200 |
| M | Second | 200 | 400 |
| N | First | 315 | 315 |
| N | Second | 315 | 630 |
| P | First | 500 | 500 |
| P | Second | 500 | 1000 |
| Q | First | 800 | 800 |
| Q | Second | 800 | 1600 |
| R | First | 1250 | 1250 |
| R | Second | 1250 | 2500 |

AQL column headings (each with Ac and Re sub-columns):
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

Legend:
- ⬇ = 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).

Standard First / Second (Ac, Re) value pairs appearing across the table:
0,2 / 1,2 — 0,3 / 3,4 — 1,4 / 4,5 — 2,5 / 6,7 — 3,7 / 8,9 — 5,9 / 12,13 — 7,11 / 18,19 — 11,16 / 26,27 — 17,22 / 37,38 — 25,31 / 56,57

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TABLE 3 B Double Sampling Plans for Tightened Inspection (Master Table) (See 8.4 and 8.5) (continued)

Acceptable Quality Levels (tightened inspection)

Legend:

▣ = 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).

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

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

Acceptable Quality Levels (reduced inspection)†



Legend:

⇩ = 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 10.1A).

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**TABLE 4 A Multiple Sampling Plans for Normal Inspection (Master Table)** *(See 8.4 and 8.5)*

Acceptable Quality Levels (normal inspection)

| Sample size code letter | Sample | Sample size | Cumulative sample size |
|---|---|---|---|
| A | | | |
| B | | | |
| C | | | |
| D | First | 2 | 2 |
| | 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 |
| J | First | 20 | 20 |
| | Second | 20 | 40 |
| | Third | 20 | 60 |
| | Fourth | 20 | 80 |
| | Fifth | 20 | 100 |
| | Sixth | 20 | 120 |
| | Seventh | 20 | 140 |

Legend:

↓ = Use first sampling plan below arrow (refer to continuation of table on following page, where 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 (or alternatively, use multiple sampling plan below, where available).

† = Use corresponding double sampling plan (or alternatively, use multiple sampling plan below one, where available).

* = Acceptance not permitted at this sample size.

5.3.1.2 As an alternative to a single sampling plan with an acceptance number of 0, use the plan with an acceptance number of 1 with its correspondingly larger sample size for a designated AQL (where available) 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, use any one. 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.

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**TABLE 4 A Multiple Sampling Plans for Normal Inspection (Master Table)** *(Continued)* *(See 8.4 and 8.5)* (continued)

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.

**TABLE 4 B Multiple Sampling Plans for Tightened Inspection (Master Table)** *(See 8.4 and 8.5) (continued)*

*Acceptable Quality Levels (tightened inspection)*

(Master table of Acceptance (Ac) and Rejection (Re) numbers arranged by Acceptable Quality Levels from 0.010 to 1000, with sample size code letters A through J, cumulative sample sizes, and First through Seventh sample rows.)

Legend:

- ↓ 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 (or alternatively, use multiple sampling plan below, where available).
- Use corresponding double sampling plan (or alternatively, use multiple sampling plan below, where available).
- * = Acceptance not permitted at this sample size.

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.

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**TABLE 4 B Multiple Sampling Plans for Tightened Inspection (Master Table)** *(Continued)* *(See 8.4 and 8.5)* *(continued)*

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.

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**TABLE 4 C Multiple Sampling Plans for Reduced Inspection (Master Table)** *(See 8.4 and 8.5) (continued)*



= Use first sampling plan below arrow (refer to a 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 (or alternatively, use multiple sampling plan below, where available)

= Use corresponding double sampling plan (or alternatively, use multiple sampling plan below, where available)

= Acceptance not permitted at this sample size.

= If, after the final sample, 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).

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, it is acceptable for the sampling procedure to terminate without either acceptance or rejection criteria

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