This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: E2234 – 09 (Reapproved 2023)

An American National Standard

Standard Practice for Sampling a Stream of Product by Attributes Indexed by AQL[1]

This standard is issued under the fixed designation E2234; 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 establishes lot or batch sampling plans and procedures for inspection by attributes using MIL-STD-105E as a basis for sampling a steady stream of lots indexed by acceptance quality limit (AQL).

1.2 This practice provides the sampling plans of MIL-STD-105E in ASTM format for use by ASTM committees and others. It recognizes the continuing usage of MIL-STD-105E in industries supported by ASTM. Most of the original text in MIL-STD-105E is preserved in Sections 4 – 6 of this practice.

1.3 No system of units is specified in this standard.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E456 Terminology Relating to Quality and Statistics

E1994 Practice for Use of Process Oriented AOQL and LTPD Sampling Plans

E2586 Practice for Calculating and Using Basic Statistics

2.2 *Other Standard:*

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

3. Terminology

3.1 *Definitions*—For a more extensive list of terms in E11 standards, see Terminology E456.

3.1.1 *acceptance quality limit (AQL), n*—quality limit that is the worst tolerable process average when a continuing series of lots is submitted for acceptance sampling.

3.1.1.1 *Discussion*—This definition supersedes that given in MIL-STD-105E.

3.1.2 *average outgoing quality (AOQ), n*—the average percent defective of outgoing product including all accepted lots or batches after any defectives found in them are replaced by acceptable units, plus all lots or batches which are not accepted after such lots or batches have been effectively 100 % inspected and all defective units replaced by acceptable units. **E1994**

3.1.3 *average outgoing quality limit (AOQL), n*—the AOQL is the maximum of the AOQ's for all possible incoming percentages defective for the process for a given acceptance sampling plan. **E1994**

3.1.4 *classification of defects, n*—the enumeration of possible defects of the unit of product classified according to their seriousness, that is, critical, major, or minor defect.

3.1.5 *critical defect, n*—a defect that judgment and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product, or a defect that judgment and experience indicate is likely to prevent performance of the function of a major end item.

3.1.6 *defect, n*—any nonconformance of the unit of product with specified requirements.

3.1.7 *double sampling plan, n*—a multiple sampling plan in which up to two samplings can be taken and evaluated to accept or reject a lot.

[1] This practice is under the jurisdiction of ASTM Committee E11 on Quality and Statistics and is the direct responsibility of Subcommittee E11.30 on Statistical Quality Control.

Current edition approved Jan. 1, 2023. Published February 2023. Originally approved in 2005. Last previous edition approved in 2018 as E2234 – 09(2018). DOI: 10.1520/E2234-09R23.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

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3.1.8 *inspection, n*—the process of measuring, examining, testing, or otherwise comparing the unit of product with the requirements.

3.1.9 *inspection by attributes, n*—inspection whereby either the unit of product is classified simply as defective or non-defective, or the number of defects in the unit of product is counted, with respect to a given requirement or set of requirements.

3.1.10 *inspection lot, n*—a collection of units of product produced under conditions that are considered uniform and from which a sample is drawn and inspected.

3.1.11 *major defect, n*—a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

3.1.12 *minor defect, n*—a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

3.1.13 *multiple sampling plan, n*—a sampling plan in which successive samples from a lot are drawn and after each sample is inspected a decision is made to accept the lot, reject the lot, or to take another sample, based on quality level of the combined samples.

3.1.13.1 *Discussion*—When the quality is much less or much more than the AQL, the decision can be made on the first sample, which is smaller than that of a single sampling plan with equivalent acceptance quality level. For samples that are close to the AQL in quality, additional samples are required and the total sample size will be larger than the corresponding single sampling plan.

3.1.14 *operating characteristic, n*—probability of acceptance using a specified acceptance sampling plan, as a function of parameters describing quality of the lot.

3.1.15 *sample, n*—a group of observations, test results, taken from a large collection of observations, test results, which serves to provide information that may be used as a basis for making a decision concerning the larger collection. **E2586**

3.1.15.1 *Discussion*—A sample consists of one or more units of product drawn from an inspection lot, the units of the sample being selected at random without regard to their quality. The number of units of product in the sample is the sample size.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *batch (in inspection), n*—a collection of units of product produced under conditions that are considered uniform and from which a sample is drawn and inspected, and may differ from a collection of units designated as a batch for other purposes, for example, production, shipment, etc.

3.2.2 *batch size, n*—the number of units of product in a batch.

3.2.3 *critical defective, n*—a unit of product which contains one or more critical defects and may also contain major or minor defects, or both.

3.2.4 *defective, n*—a unit of product which contains one or more defects.

3.2.5 *defects per hundred units, n*—any given quantity of units of product is one hundred times the number of defects contained therein (one or more defects being possible in any unit of product) divided by the total number of units of product, that is:

$$\text{Defects per hundred units} = \frac{\text{Number of defects} \times 100}{\text{Number of units inspected}} \quad (1)$$

3.2.6 *lot, n*—see *batch*.

3.2.7 *lot size, n*—see *batch size*.

3.2.8 *major defective, n*—a unit of product which contains one or more major defects, and may also contain minor defects but contains no critical defect.

3.2.9 *minor defective, n*—a unit of product which contains one or more minor defects but contains no critical or major defect.

3.2.10 *percent defective, n*—any given quantity of units of product one hundred times the number of defective units of product contained therein divided by the total number of units of product, that is:

$$\text{Percent Defective} = \frac{\text{Number of defectives} \times 100}{\text{Number of units inspected}} \quad (2)$$

3.2.11 *process average (in inspection), n*—the average percent defective or average number of defects per hundred units (whichever is applicable) of product submitted by the supplier for original inspection.

3.2.11.1 *Discussion*—Original inspection is the first inspection of a particular quantity of product as distinguished from the inspection of product which has been resubmitted after prior rejection.

3.2.12 *sample size code letter, n*—a device used along with the AQL for locating a sampling plan on a table of sampling plans.

3.2.13 *sampling plan (in inspection), n*—a plan that indicates the number of units of product from each lot or batch which are to be inspected (sample size or series of sample sizes) and the criteria for determining the acceptability of the lot or batch (acceptance and rejection numbers).

3.2.14 *unit of product, n*—that which is inspected in order to determine its classification as defective or non-defective or to count the number of defects.

3.2.14.1 *Discussion*—It may be a single article, a pair, a set, a length, an area, an operation, a volume, a component of an end product, or the end product itself. The unit of product may or may not be the same as the unit of purchase, supply, production, or shipment.

4. Significance and Use

4.1 *Purpose*—This publication establishes lot or batch sampling plans and procedures for inspection by attributes. This publication shall not be interpreted to supersede or conflict with any contractual requirements. The words "accept," "acceptance," "acceptable," etc, refer only to the contractor's use of the sampling plans contained in this standard and do not imply an agreement by the customer (formerly "Government" in original text) to accept any product or determination of

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acceptability by the customer shall be as described in contractual documents. The sampling plans described in this standard are applicable to AQL's of 0.01 % or higher and are therefore not suitable for applications where quality levels in the range of parts per million levels can be realized.

4.2 *Application*—Sampling plans designated in this publication are applicable, but not limited, to inspection of the following: (*1*) end items, (*2*) components and raw materials, (*3*) operations or services, (*4*) materials in process, (*5*) supplies in storage, (*6*) maintenance operations, (*7*) data or records, (*8*) administrative procedures. These plans are intended primarily to be used for a continuing series of lots or batches. The plans may also be used for the inspection of isolated lots or batches, but, in this latter case, the user is cautioned to consult the operating characteristic curves to find a plan which will yield the desired protection (see 6.11).

5. Definitions

5.1 *Acceptable Quality Level (AQL)*—When a continuous series of lots is considered, the AQL is the quality level which, for the purposes of sampling inspection, is the limit of a satisfactory process average (see 5.19).

5.1.1 A sampling plan and an AQL are chosen in accordance with the risk assumed. Use of a value of AQL for a certain defect or group of defects indicates that the sampling plan will accept the great majority of the lots or batches provided the process average level of percent defective (or defects per hundred units) in these lots or batches be no greater than the designated value of AQL. Thus, the AQL is a designated value of percent defective (or defects per hundred units) for which lots will be accepted most of the time by the sampling procedure being used.

5.1.2 The sampling plans provided herein are so arranged that the probability of acceptance at the designated AQL value depends upon the sample size, being generally higher for large samples than for small ones, for a given AQL. The AQL alone does not identify the chances of accepting or rejecting individual lots or batches but more directly relates to what might be expected from a series of lots or batches, provided the steps indicated in this publication are taken. It is necessary to refer to the operating characteristic curve of the plan to determine the relative risks.

5.2 *Average Outgoing Quality (AOQ)*—For a particular process average, the AOQ is the average quality of outgoing product including all accepted lots or batches, plus all rejected lots or batches after the rejected lots or batches have been effectively 100 % inspected and all defectives replaced by non-defectives.

5.3 *Average Outgoing Quality Limit (AOQL)*—The AOQL is the maximum AOQ for a given acceptance sampling plan. Factors for computing AOQL values are given in Table V-A for each of the single sampling plans for normal inspection and in Table V-B for each of the single sampling plans for tightened inspection.

5.4 *Classification of Defects*—A classification of defects is the enumeration of possible defects of the unit of product classified according to their seriousness

5.5 *Critical Defect*—A critical defect is a defect that judgment and experience indicate would result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product, or a defect that judgment and experience indicate is likely to prevent performance of the tactical function of a major end item such as a ship, aircraft, tank, missile, or space vehicle.

5.6 *Critical Defective*—A critical defective is a unit of product which contains one or more critical defects and may also contain major or minor defects, or both.

5.7 *Defect*—A defect is any nonconformance of the unit of product with specified requirements.

5.8 *Defective*—A defective is a unit of product which contains one or more defects.

5.9 *Defects per Hundred Units*—The number of defects per hundred units of any given quantity of units of product is one hundred times the number of defects contained therein (one or more defects being possible in any unit of product) divided by the total number of units of product, that is:

$$\text{Defects per hundred units} = \frac{\text{Number of defects} \times 100}{\text{Number of units inspected}}$$

5.10 *Inspection*—Inspection is the process of measuring, examining, testing, or otherwise comparing the unit of product with the requirements.

5.11 *Inspection by Attributes*—Inspection by attributes is inspection whereby either the unit of product is classified simply as defective or non-defective, or the number of defects in the unit of product is counted, with respect to a given requirement or set of requirements.

5.12 *Lot or Batch*—The term lot or batch shall mean "inspection lot" or "inspection batch", that is, a collection of units of product from which a sample is to be drawn and inspected and may differ from a collection of units designated as a lot or batch for other purposes (for example, production, shipment, etc.).

5.13 *Lot or Batch Size*—The lot or batch size is the number of units of product in a lot or batch.

5.14 *Major Defect*—A major defect is a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

5.15 *Major Defective*—A major defective is a unit of product which contains one or more major defects, and may also contain minor defects but contains no critical defect.

5.16 *Minor Defect*—A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

5.17 *Minor Defective*—A minor defective is a unit of product which contains one or more minor defects but contains no critical or major defect.

5.18 *Percent Defective*—The percent defective of any given quantity of units of product is one hundred times the number of

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defective units of product contained therein divided by the total number of units of product, that is:

$$\text{Percent defective} = \frac{\text{Number of defectives} \times 100}{\text{Number of units inspected}}$$

5.19 *Process Average*—The process average is the average percent defective or average number of defects per hundred units (whichever is applicable) of product submitted by the supplier for original inspection. Original inspection is the first inspection of a particular quantity of product as distinguished from the inspection of product which has been resubmitted after prior rejection.

5.20 *Sample*—A sample consists of one or more units of product drawn from a lot or batch, the units of the sample being selected at random without regard to their quality. The number of units of product in the sample is the sample size.

5.21 *Sample Size Code Letter*—The sample size code letter is a device used along with the AQL for locating a sampling plan on a table of sampling plans.

5.22 *Sampling Plan*—A sampling plan indicates the number of units of product from each lot or batch which are to be inspected (sample size or series of sample sizes) and the criteria for determining the acceptability of the lot or batch (acceptance and rejection numbers).

5.23 *Unit of Product*—The unit of product is the thing inspected in order to determine its classification as defective or non-defective or to count the number of defects. It may be a single article, a pair, a set, a length, an area, an operation, a volume, a component of an end product, or the end product itself. The unit of product may or may not be the same as the unit of purchase, supply, production, or shipment.

6. General Requirements

6.1 *Written Procedures*—Written procedures are ordinarily developed and made available for the customer's review, upon request. When the written procedures indicate use of this standard, they shall comply with the requirements of this standard and reference appropriate parts as necessary.

6.2 *Nonconformance*—The extent of nonconformance of product shall be expressed either in terms of percent defective or in terms of defects per hundred units.

6.3 *Formation and Identification of Lots or Batches*—The product shall be assembled into identifiable lots, sublots, batches, or in such other manner as may be prescribed. Each lot or batch shall, as far as is practicable, consist of units of product of a single type, grade, class, size, and composition, manufactured under essentially the same conditions, and at essentially the same time. The lots or batches shall be identified by the contractor and shall be kept intact in adequate and suitable storage space.

6.4 *AQL:*

6.4.1 *AQL Use*—The AQL, together with the Sample Size Code Letter, is used for indexing the sampling plans provided herein.

6.4.2 *Limitation*—The selection or use of an AQL shall not imply that the contractor has the right to supply any defective unit of product.

6.4.3 *Choosing AQLs*—Different AQLs may be chosen for groups of defects considered collectively, or for individual defects. An AQL for a group of defects may be chosen in addition to AQLs for individual defects, or subgroups, within that group. AQL values of 10.0 or less may be expressed either in percent defective or in defects per hundred units; those over 10.0 shall be expressed in defects per hundred units only.

6.5 *Sampling:*

6.5.1 *Representative (Stratified) Sampling*—When appropriate, the number of units in the sample shall be selected in proportion to the size of sublots or sub-batches, or parts of the lot or batch, identified by some rational criterion. When representative sampling is used, the units from each sublot, sub-batch, or part of the lot or batch shall be selected at random.

6.5.2 *Time of Sampling*—A sample may be drawn after all the units comprising the lot or batch have been assembled, or sample units may be drawn during assembly of the lot or batch, in which case the size of the lot or batch will be determined before any sample units are drawn. If the sample units are drawn during assembly of the lot or batch, and if the rejection number is reached before the lot is completed, that portion of the lot already completed shall be rejected. The cause of the defective product shall be determined and corrective action taken, after which a new lot or batch shall be begun.

6.5.3 *Double or Multiple Sampling*—When double or multiple sampling is to be used, each sample shall be selected over the entire lot or batch.

6.6 *Inspection Procedures*—Normal inspection will be used at the start of inspection. Normal, tightened or reduced inspection shall continue unchanged for each class of defects or defectives on successive lots or batches except where the switching procedures given below require change. The switching procedures shall be applied to each class of defects or defectives independently.

6.7 *Switching Procedures:*

6.7.1 *Normal to Tightened*—When normal inspection is in effect, tightened inspection shall be instituted when 2 out of 2, 3, 4, or 5 consecutive lots or batches have been rejected on original inspection (that is, ignoring resubmitted lots or batches for this procedure).

6.7.2 *Tightened to Normal*—When tightened inspection is in effect, normal inspection shall be instituted when 5 consecutive lots or batches have been considered acceptable on original inspection.

6.7.3 *Normal to Reduced*—When normal inspection is in effect, reduced inspection shall be instituted provided that all of the following conditions are satisfied:

6.7.3.1 The preceding 10 lots or batches (or more, as indicated by the note to Table VIII) have been on normal inspection and all have been accepted on original inspection; and

6.7.3.2 The total number of defectives (or defects) in the samples from the preceding 10 lots or batches (or such other number as was used for condition "a" above) is equal to or less than the applicable number given in Table VIII. If one or

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multiple sampling is in use, all samples inspected should be included, not "first" samples only; and

6.7.3.3 Production is at a steady rate; and

6.7.3.4 Reduced inspection is considered desirable.

6.7.4 *Reduced to Normal*—When reduced inspection is in effect, normal inspection shall be instituted if any of the following occur on original inspection:

6.7.4.1 A lot or batch is rejected; or

6.7.4.2 A lot or batch is considered acceptable under the procedures of 6.10.1.4, or

6.7.4.3 Production becomes irregular or delayed; or

6.7.4.4 Other conditions warrant that normal inspection shall be instituted.

6.8 *Discontinuation of Inspection*—If the cumulative number of lots not accepted in a sequence of consecutive lots on original tightened inspection reaches five, the acceptance procedures of this standard shall be discontinued. Inspection under the provisions of this standard shall not be resumed until corrective action has been taken. Tightened inspection shall then be used as if 6.7.1 had been invoked.

6.9 *Sampling Plans:*

6.9.1 *Inspection Level*—The inspection level determines the relationship between the lot or batch size and the sample size. The inspection level to be used for any particular requirement will be as prescribed by the contractor's written procedures. Three inspection levels: I, II, and III, are given in Table I for general use (see 6.1). Normally, Inspection Level II is used. However, Inspection Level I may be used when less discrimination is needed, or Level III may be used 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.

6.9.1.1 In the selection of inspection levels S-1 to S-4, care must be exercised to avoid AQLs inconsistent with these inspection levels. In other words, the purpose of the special inspection levels is to keep samples small when necessary. For instance, the code letters under S-1 go no further than D, equivalent to a single sample of size 8, but it is of no use to choose S-1 if the AQL is 0.10 % for which the minimum sample is 125.

6.9.2 *Code Letters*—Sample sizes are designated by code letters. Table I shall be used to find the applicable code letter for the particular lot or batch size and the prescribed inspection level.

6.9.3 *Obtaining Sampling Plan*—The AQL and the code letter shall be used to obtain the sampling plan from Tables II, III, or IV. When no sampling plan is available for a given combination of AQL and code letter, the tables direct the user to a different letter. The sample size to be used is given by the new code letter, not by the original letter. If this procedure leads to different sample sizes for different classes of defects, the code letter corresponding to the largest sample size derived may be used for all classes of defects. 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.

6.9.4 *Types of Sampling Plans*—Three types of sampling plans; Single, Double, and Multiple, are given in Tables II, III, and IV, 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 (see Table IX). Usually the administrative difficulty for single sampling and the cost per unit of the sample are less than for double or multiple.

6.10 *Determination of Acceptability:*

6.10.1 *Percent Defective Inspection*—To determine acceptability of a lot or batch under percent defective inspection, the applicable sampling plan shall be used in accordance with 6.10.1.1 – 6.10.1.4.

6.10.1.1 *Single Sampling Plan*—The number of sample units inspected shall be equal to the sample size given by the plan. If the number of defectives found in the sample is equal to or less than the acceptance number, the lot or batch shall be considered acceptable. If the number of defectives is equal to or greater than the rejection number, the lot or batch shall be rejected.

6.10.1.2 *Double Sampling Plan*—A number of sample units equal to the first sample size given by the plan shall be inspected. If the number of defectives found in the first sample is equal to or less than the first acceptance number, the lot or batch shall be considered acceptable. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the lot or batch shall be rejected. If the number of defectives found in the first sample is between the first acceptance and rejection numbers, a second sample of the same size shall be inspected. The number of defectives found in the first and second samples shall be accumulated. If the cumulative number of defectives is equal to or less than the second acceptance number, the lot or batch shall be considered acceptable. If the cumulative number of defectives is equal to or greater than the second rejection number, the lot or batch shall be rejected.

6.10.1.3 *Multiple Sample Plan*—Under multiple sampling, the procedure shall be similar to that specified in 6.10.1.2, except that the number of successive samples required to reach a decision may be as many as seven.

6.10.1.4 *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 or batch will be considered acceptable, but normal inspection will be reinstated starting with the next lot or batch (see 6.7.4.2).

6.10.2 *Defects per Hundred Units Inspection*—To determine the acceptability of a lot or batch under defects per hundred units inspection, the procedure specified for percent defective inspection above shall be used, except that the word "defects" shall be substituted for "defectives."

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6.11 *Limiting Quality Protection*—The sampling plans and associated procedures given in this publication were designed for use where the units of product are produced in a continuing series of lots or batches over a period of time. However, if the lot or batch is of an isolated nature, it is desirable to limit the selection of sampling plans to those, associated with a designated AQL value, that provide not less than a specified limiting quality protection. Sampling plans for this purpose can be selected by choosing a limiting quality (LQ) and a consumer's risk to be associated with it. Tables VI and VII give values of LQ for the commonly used consumer's risks of 10 % and 5 % respectively. If a different value of consumer's risk is required, the O.C. curves and their tabulated values may be used. The concept of LQ may also be useful in specifying the AQL and Inspection Levels for a series of lots or batches, thus fixing minimum sample size where there is some reason for avoiding (with more than a given consumer's risk) more than a limiting proportion of defectives (or defects) in any single lot or batch.

6.12 *Curves:*

6.12.1 *Operating Characteristic Curves*—The operating characteristic curves for normal inspection, shown in Table X, indicate the percentage of lots or batches which may be expected to be accepted under the various sampling plans for a given process quality. The curves shown are for single sampling; curves for double and multiple sampling are matched as closely as practicable. The O.C. curves shown for AQLs greater than 10.0 are based on the Poisson distribution and are applicable for defects per hundred units inspection; those for AQLs of 10.0 or less and sample sizes of 80 or less are based on the binomial distribution and are applicable for percent defective inspection; those for AQLs of 10.0 or less and sample sizes larger than 80 are based the Poisson distribution and are applicable either for defects per hundred units inspection, or for percent defective inspection (the Poisson distribution being an adequate approximation to the binomial distribution under these conditions). Tabulated values, corresponding to selected values or probabilities of acceptance (P_a, in percent) are given for each of the curves shown, and, in addition, for tightened inspection, and for defects per hundred units for AQLs of 10.0 or less and sample sizes of 80 or less.

6.12.2 *Average Sample Size Curves*—Average sample size curves for double and multiple sampling are in Table IX. These show the average sample sizes which may be expected to occur under the various sampling plans for given levels of process quality. The curves assume no curtailment of inspection and are approximate to the extent that they are based upon the Poisson distribution, and that the sample sizes for double and multiple sampling are assumed to be 0. 631n and 0.25n, respectively, where n is the equivalent sample size.

7. Operating Procedure for Use in Sampling Inspection

7.1 Sections 4 – 6 of this practice preserve the structure of MIL-STD-105E for use in applications in which that standard is prescribed, or where its use is desirable, for example, where it is called out as part of the procedure contained in another standard. This section provides additional instruction on use of MIL-STD-105E in sampling inspection.

7.2 This standard is a sampling system primarily intended for use with a stream of lots where an upper limit on the process fraction defective is specified. This is the AQL. Protection against the process levels greater than the AQL is accomplished by switching among prescribed plans so that the rate of rejection of lots becomes more and more intolerable as the process average increases beyond the AQL. It is important to note that a relatively large proportion of lots will be accepted when the process average is less than or equal to the AQL.

7.3 When sampling a stream of lots, the standard is employed as follows:

7.3.1 Determine the lot size and set the AQL (see 6.4).

7.3.2 Determine the inspection level (see 6.9.1). Use Inspection Level II if none is specified.

7.3.3 Decide if single, double, or multiple sampling is to be used (see 6.10).

7.3.4 Enter Table I to determine the sample size code letter (see 6.9.2).

7.3.5 Enter Table II (single), Table III (double), or Table IV (multiple) with the lot size and code letter to determine a set of normal, tightened or reduced sampling plans which will be used in applying this sampling scheme.

7.3.6 Apply the switching rules to determine which of the three plans to apply to the next lot (see 6.6 – 6.8).

7.3.7 The switching rules must be used in application of the procedure to a stream of lots.

7.4 When an isolated lot, apart from a stream, the standard may be applied as follows:

7.4.1 Determine the AQL as above. A single lot of AQL quality will have a high probability of acceptance very often around 95 % (see 6.4).

7.4.2 Set a limiting quality level (LQ) that will have a low consumer's risk (risk of acceptance) of 10 % or 5 % as desired (see 6.11).

7.4.3 Enter Table VI or Table VII as appropriate to the consumer's risk and defect type. For a particular AQL, go down the column until a value of LQ less than or equal to the desired LQ is found. Read the corresponding code letter and AQL. Using the Normal sampling tables (Tables IIA, IIIA, or IVA) determine the sampling plan for this code letter and AQL.

7.4.4 Apply the sampling plan to the isolated lot.

7.5 Parameters of the sampling plans

7.5.1 The operating characteristic curves for individual plans are given in Table X (see 6.12).

7.5.2 The AOQL values for individual plans are given in Table V (see 5.2 and 5.3).

7.5.3 ASN curves for the double and multiple plans are given in Table IX (see 6.12.2).

7.5.4 Limit Numbers for Reduced Inspection used in the switching rules are given in Table VIII (see 6.10.1.4)

8. Keywords

8.1 acceptance quality level (AQL); average outgoing quality (AOQ); average outgoing quality limit (AOQL); classification of defects; critical defect; critical defective; defect; defective; defects per hundred units; inspection; inspection by attributes; lot or batch; lot or batch size; major defect; major

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defective; minor defect; minor defective; percent defective; process average; sample; sample size code letter; sampling plan; unit of product

ANNEX

(Mandatory Information)

A1. MASTER TABLES

See Figs. A1.1-A1.10.

Table I, Sample Size Code Letters (see 6.2 and 6.3)
Table II-A, Single Sampling Plans for Normal Inspection (see 6.4 and 6.4.1)
Table II-B, Single Sampling Plans for Tightened Inspection (see 6.4 and 6.4.1)
Table II-C, Single Sampling Plans for Reduced Inspection (see 6.4 and 6.4.1)
Table III-A, Double Sampling Plans for Normal Inspection (see 6.4 and 6.4.1)
Table III-B, Double Sampling Plans for Tightened Inspection (see 6.4 and 6.4.1)
Table III-C, Double Sampling Plans for Reduced Inspection (see 6.4 and 6.4.1)
Table IV-A, Multiple Sampling Plans for Normal Inspection (see 6.4 and 6.4.1)
Table IV-B, Multiple Sampling Plans for Tightened Inspection (see 6.4 and 6.4.1)
Table IV-C, Multiple Sampling Plans for Reduced Inspection (see 6.4 and 6.4.1)

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

FIG. A1.1 Table I Sample Size Code Letters

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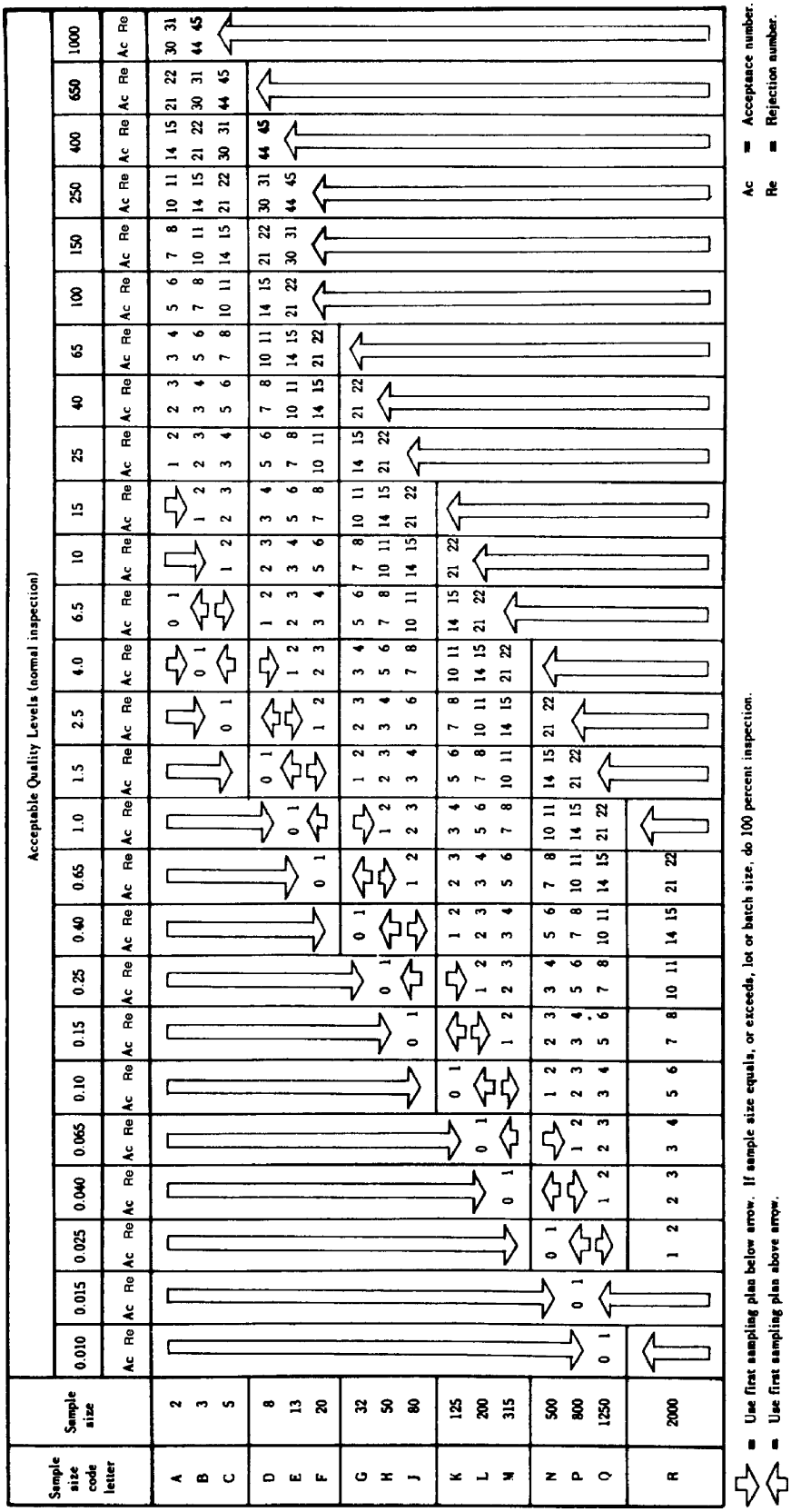


FIG. A1.2 Table II-A Single Sampling Plans for Normal Inspection

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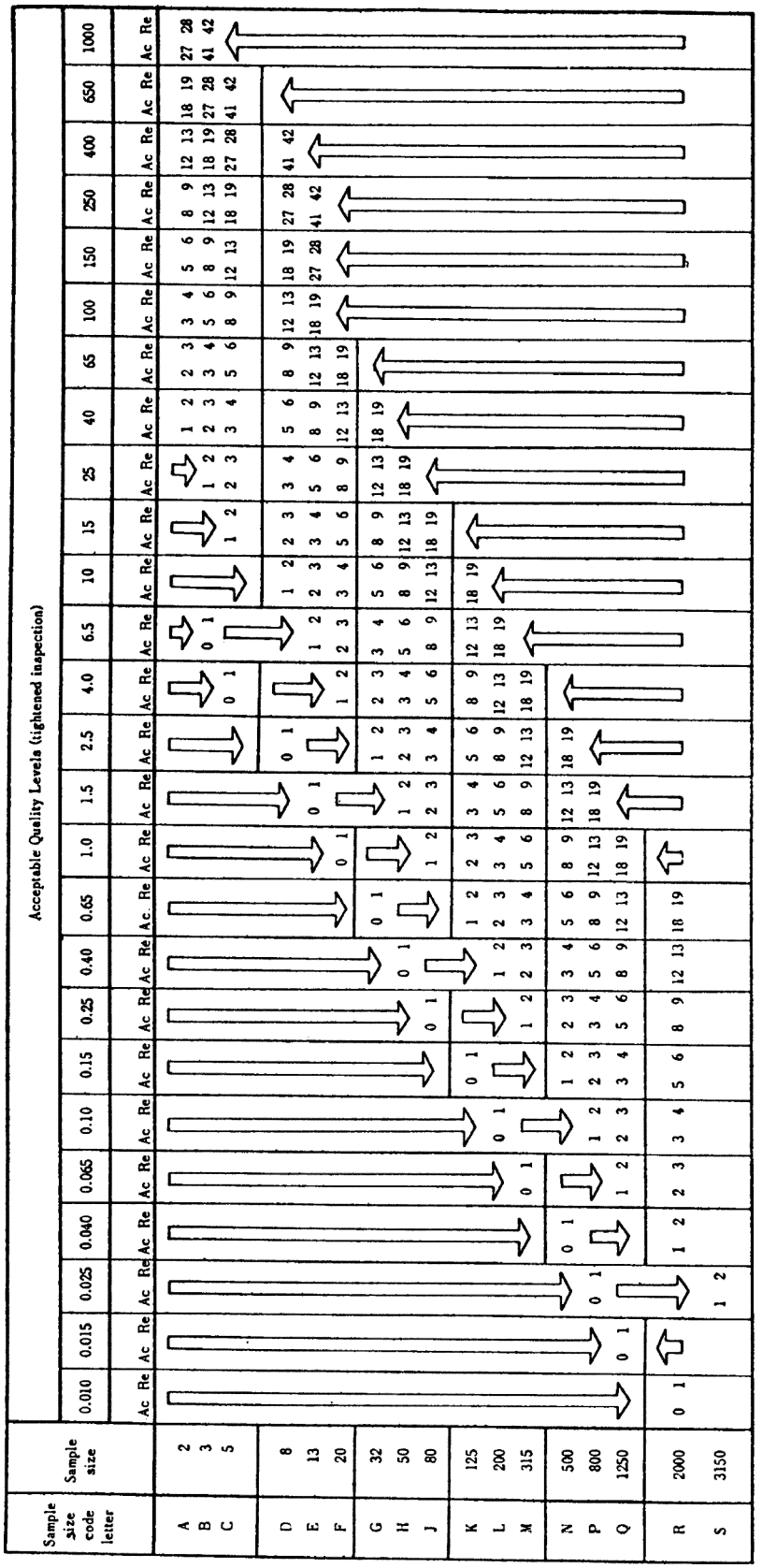


FIG. A1.3 Table II-B Single Sampling Plans for Tightened Inspection

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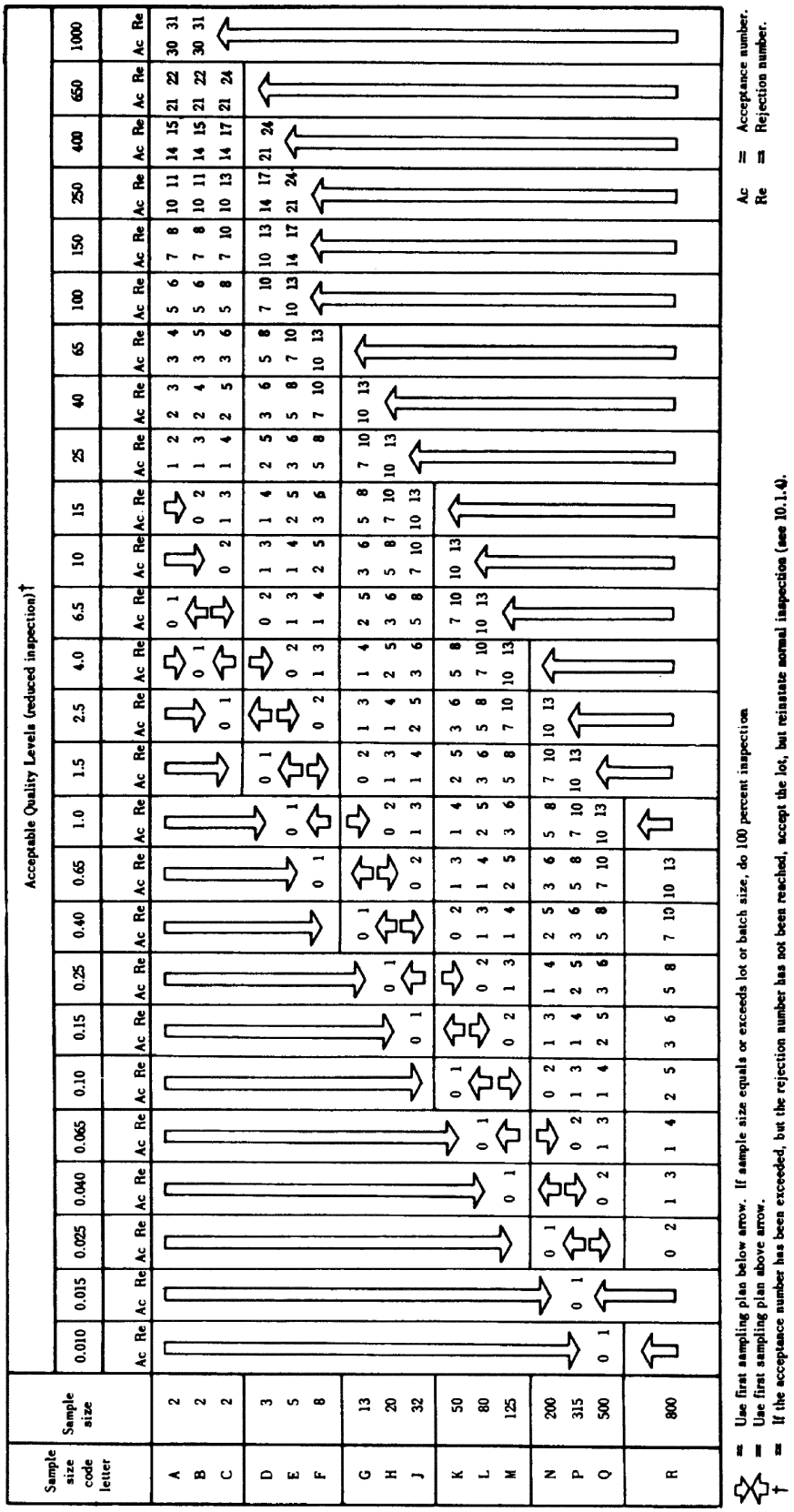


FIG. A1.4 Table II-C Single Sampling Plans for Reduced Inspection

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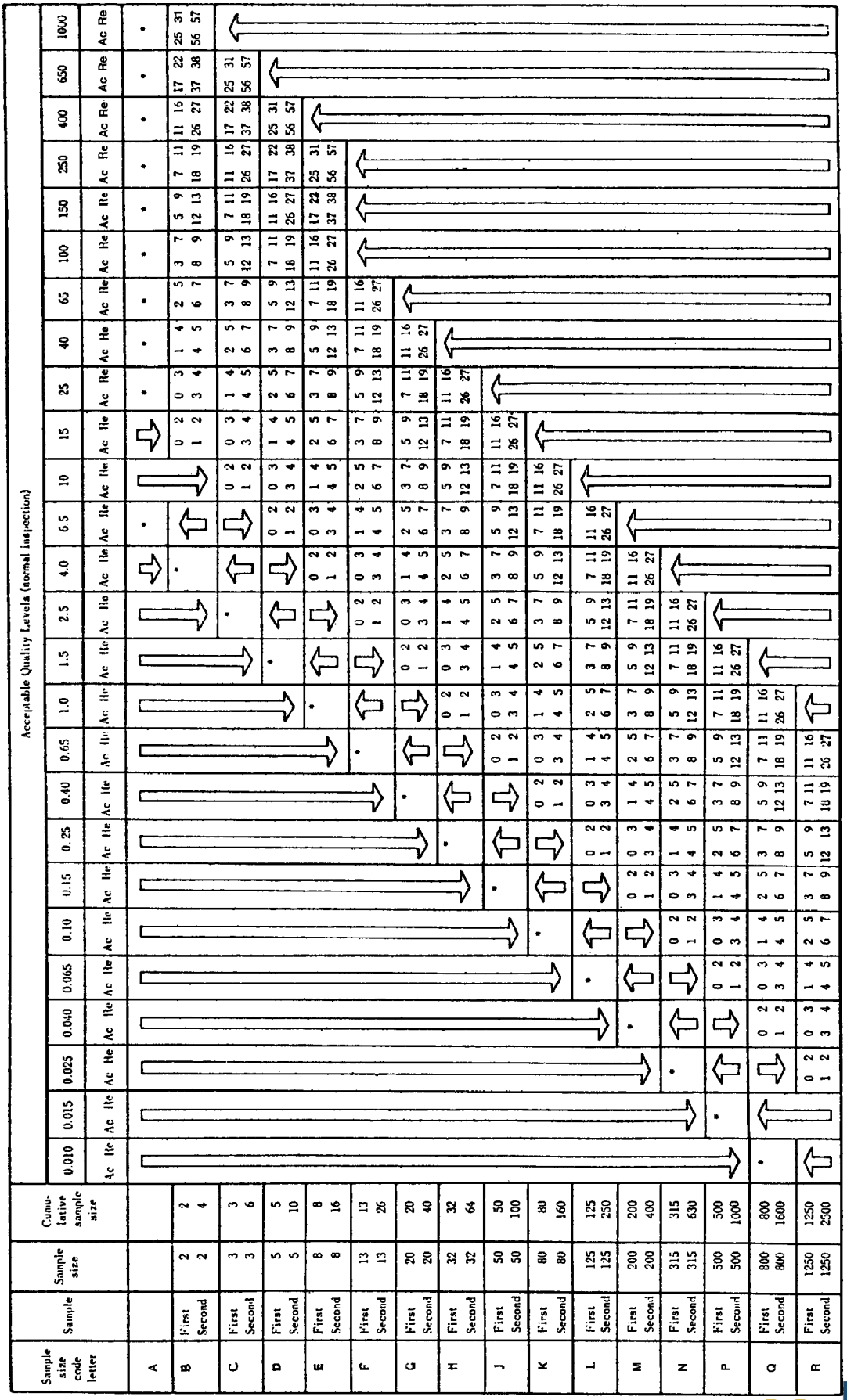


FIG. A1.5 Table III-A Double Sampling Plans for Normal Inspection

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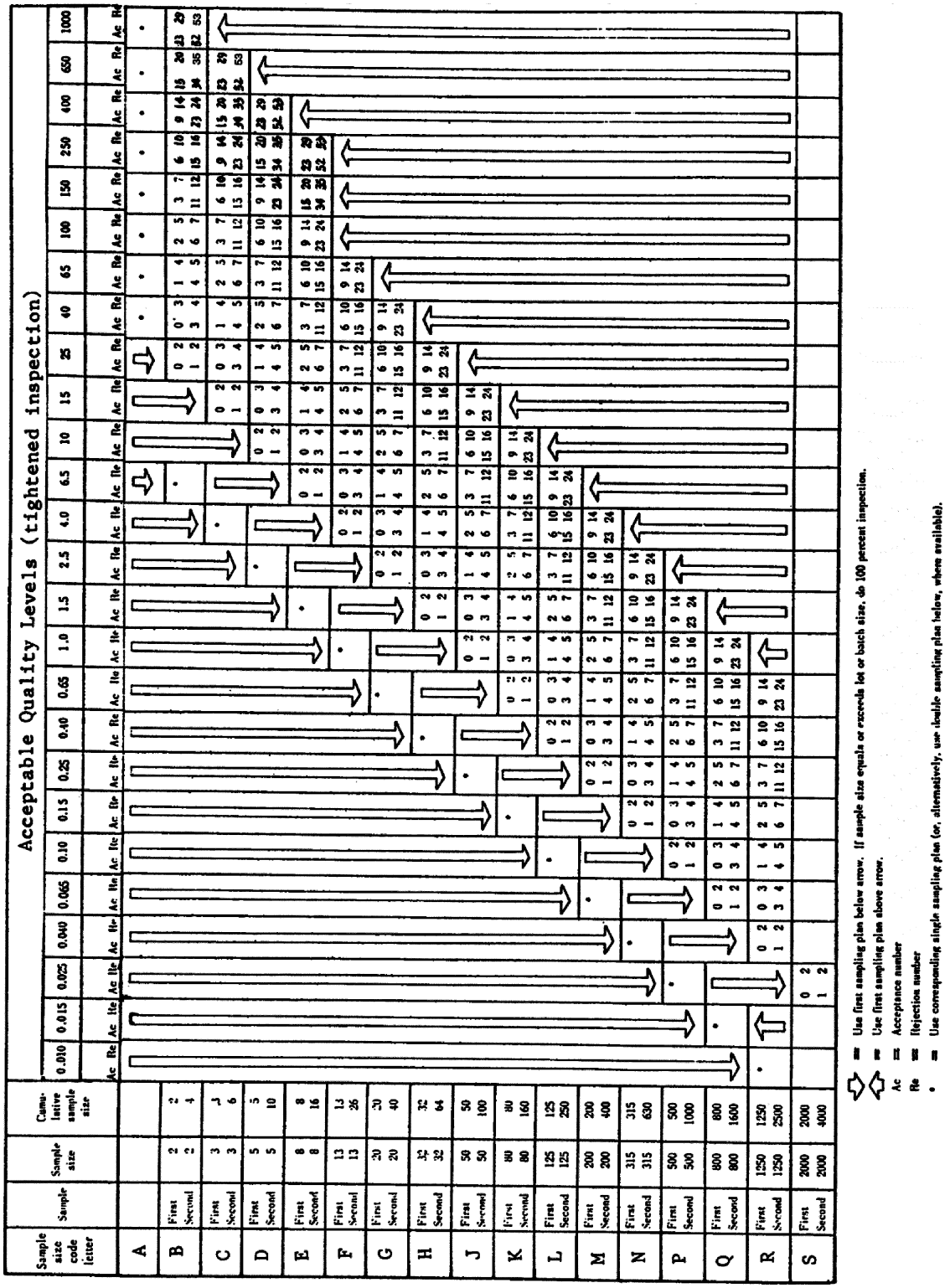


FIG. A1.6 Table III-B Double Sampling Plans for Tightened Inspection

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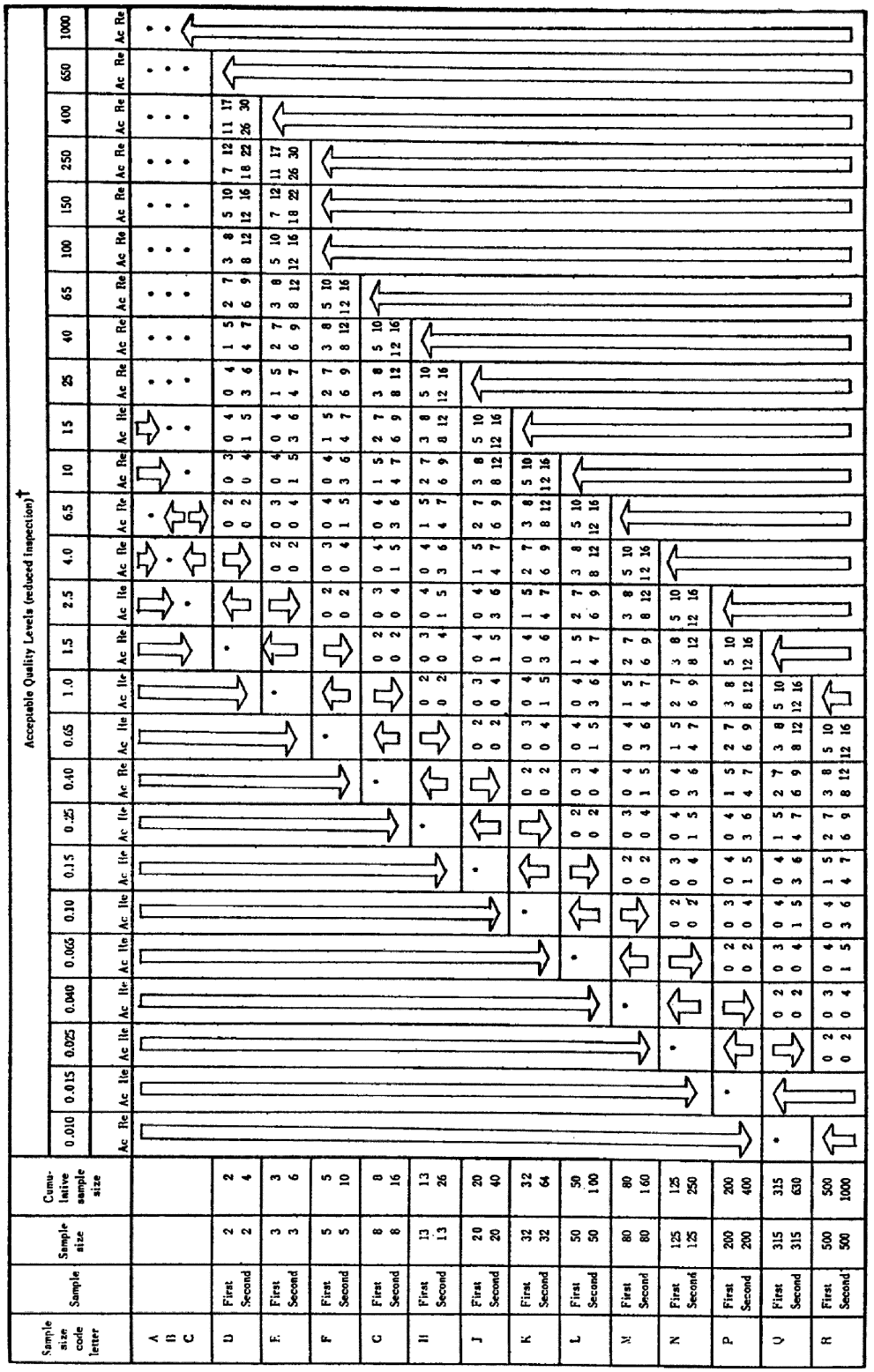


FIG. A1.7 Table III-C Double Sampling Plans for Reduced Inspection

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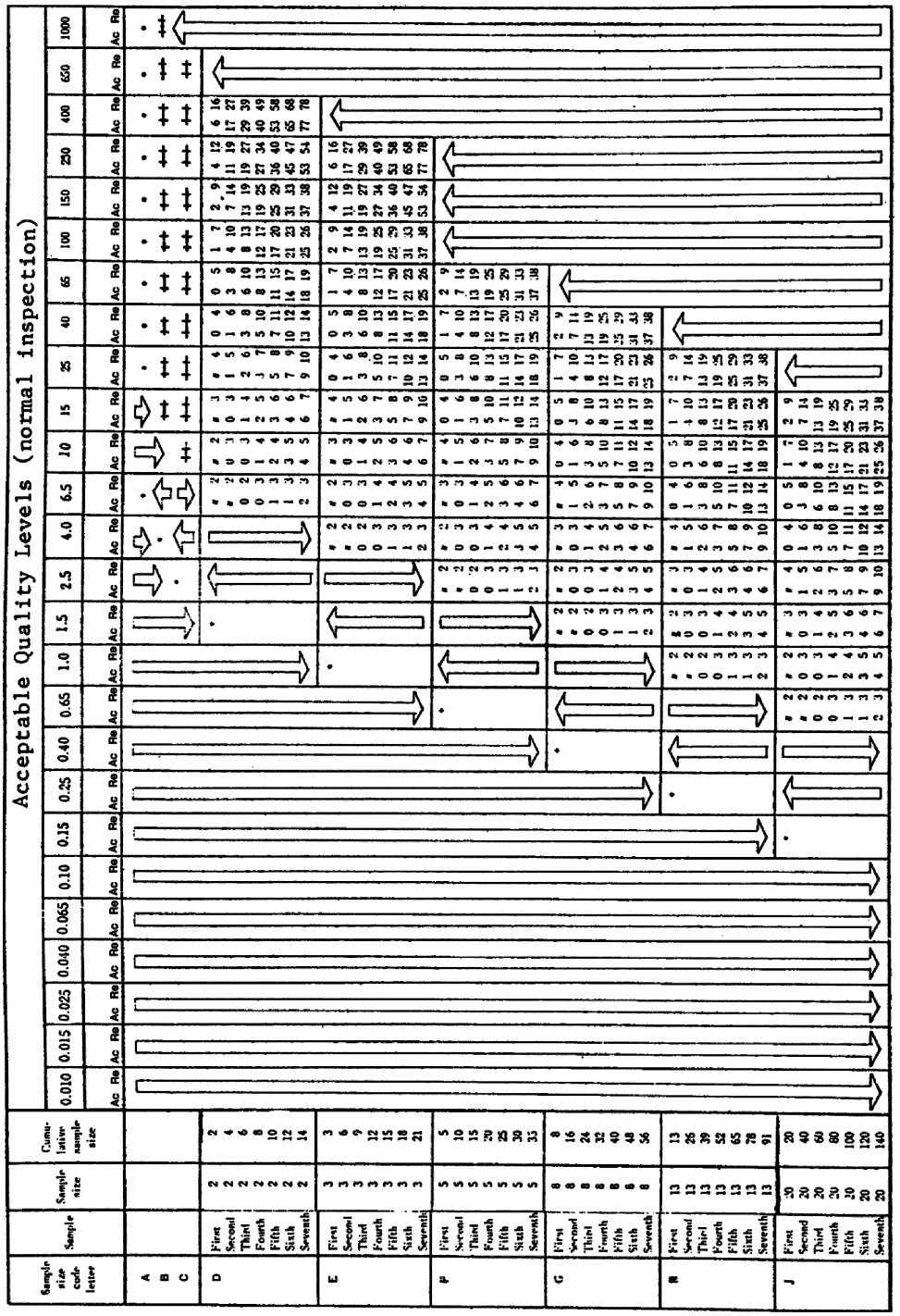


FIG. A1.8 Table IV-A Multiple Sampling Plans for Normal Inspection

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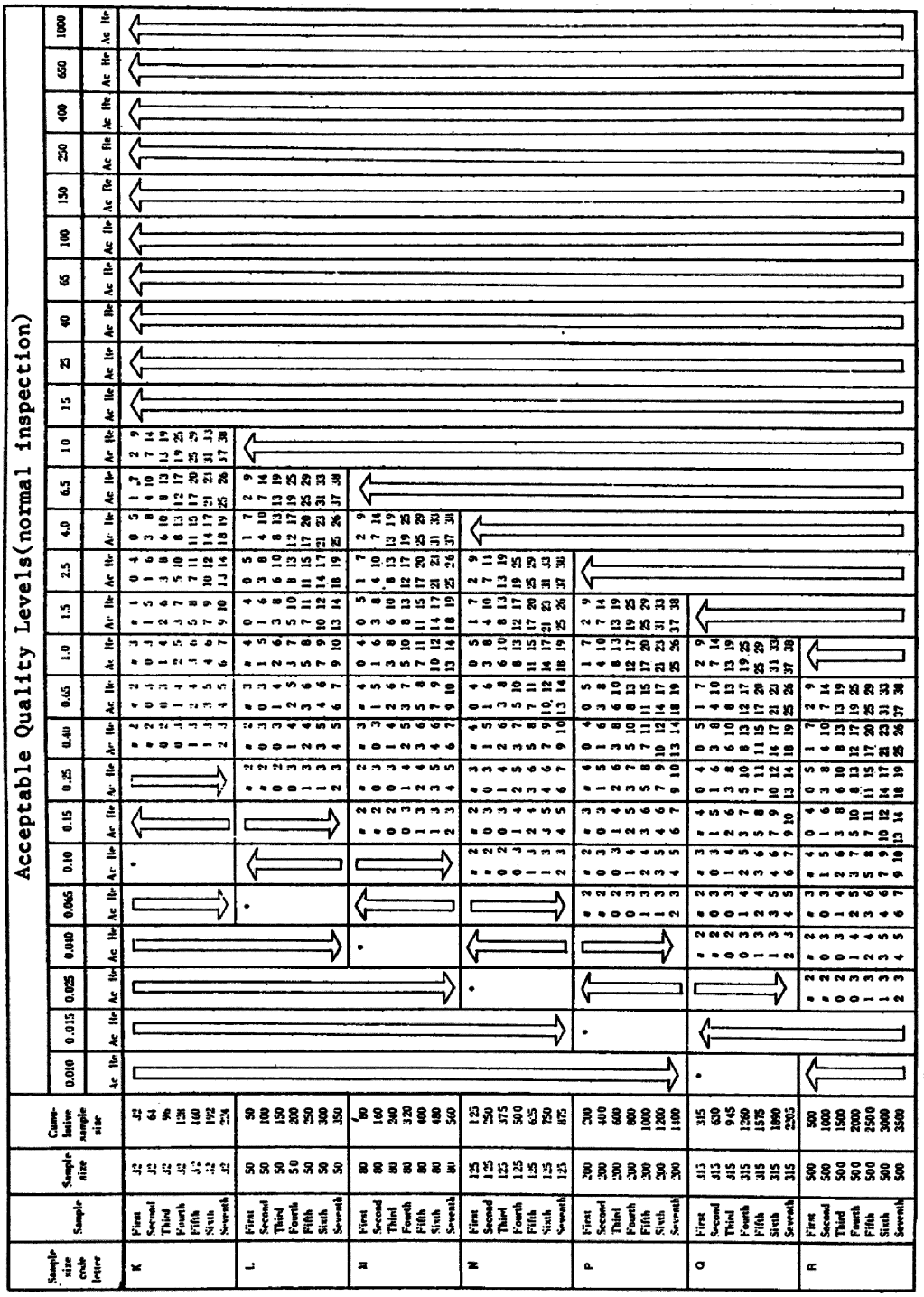


FIG. A1.8 Table IV-A Multiple Sampling Plans for Normal Inspection *(continued)*

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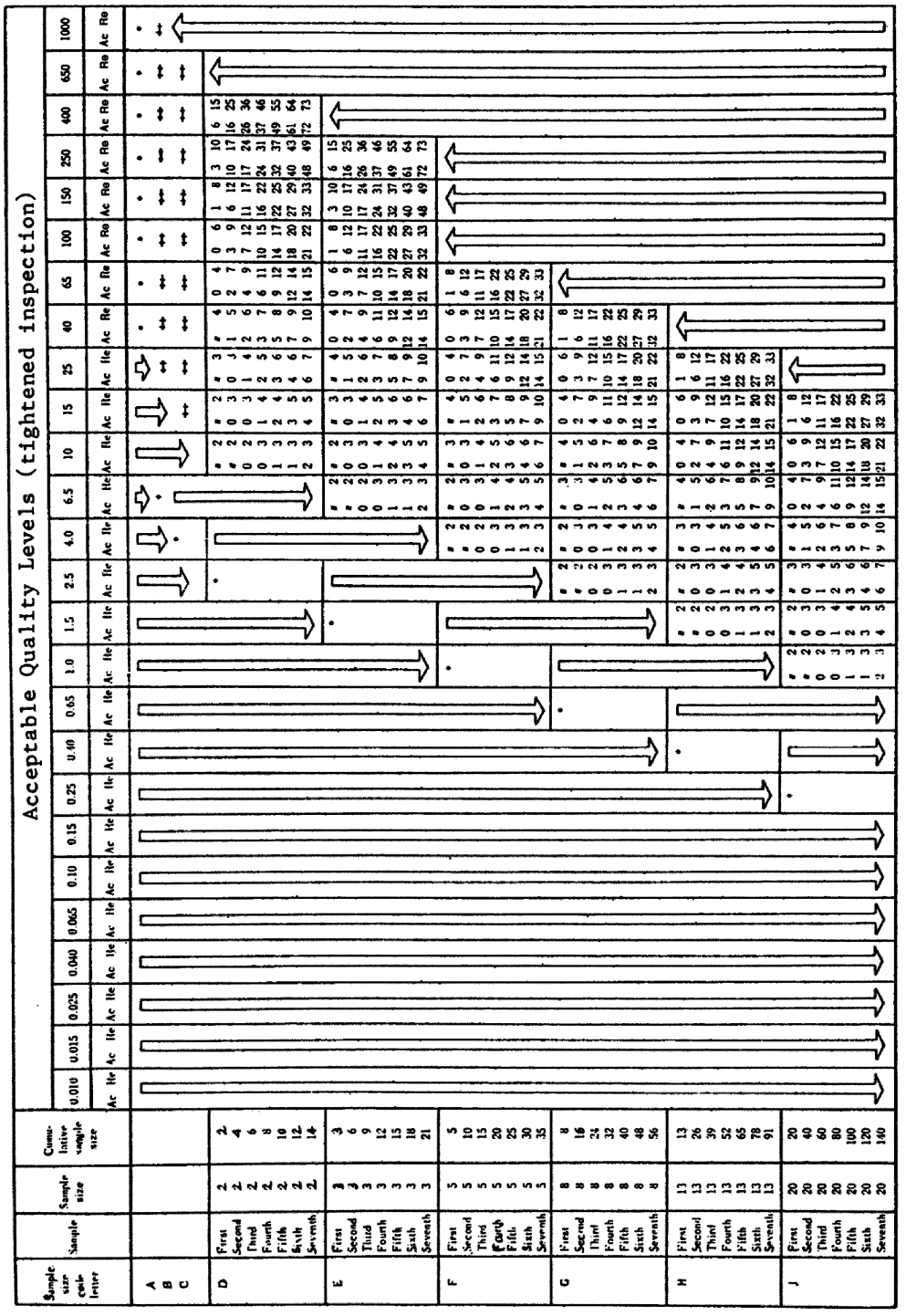


FIG. A1.9 Table IV-B Multiple Sampling Plans for Tightened Inspection

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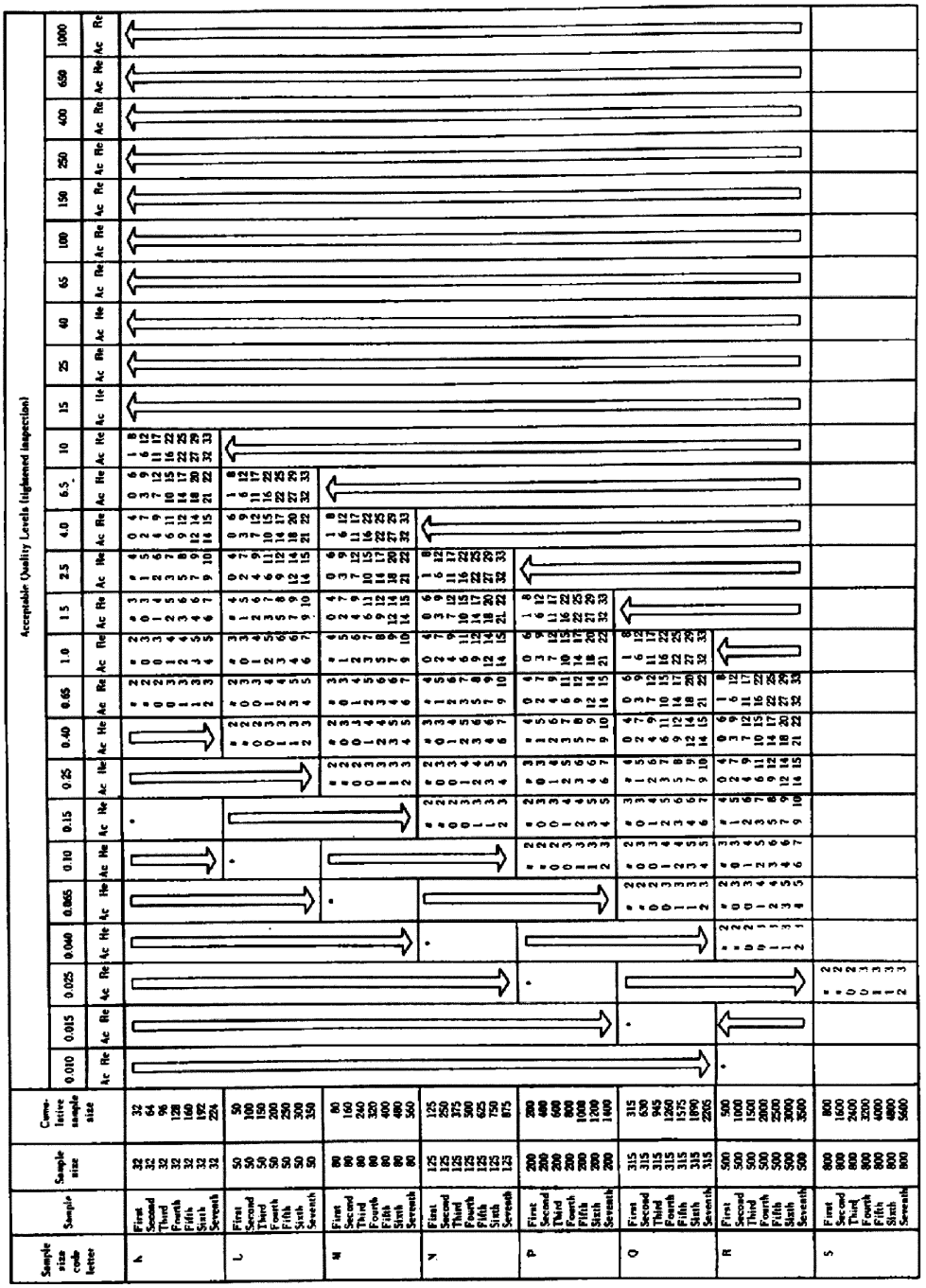


FIG. A1.9 Table IV-B Multiple Sampling Plans for Tightened Inspection *(continued)*

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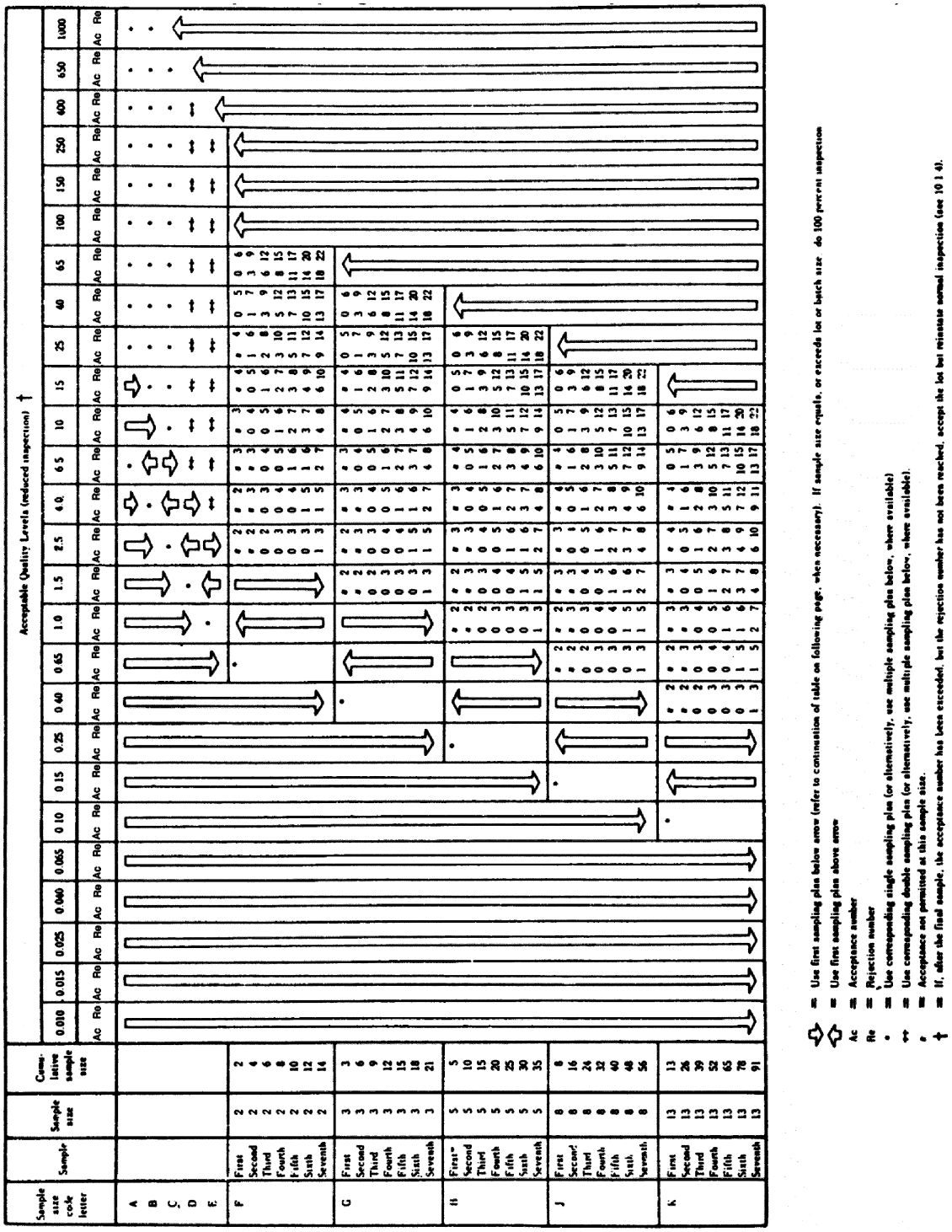


FIG. A1.10 Table IV-C Multiple Sampling Plans for Reduced Inspection

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