OCTOBER 2018

AMERICAN NATIONAL STANDARD

ASQ/ANSI Z1.9–2003 (R2018)

# SAMPLING PROCEDURES AND TABLES FOR INSPECTION BY VARIABLES FOR PERCENT NONCONFORMING

This standard is a reaffirmation of ANSI/ASQ Z1.9-2003 (R2013)

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*Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming*

Prepared by
ASQ (ASC Z1) Subcommittee on the Application of Statistical Methods

ANSI-Accredited Standards Developer (ASD)
American Society for Quality

## ABSTRACT

Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming is an acceptance sampling system to be used on a continuing stream of lots for AQL specified. It provides tightened, normal, and reduced plans to be used on measurements which are normally distributed. Variation may be measured by sample standard deviation, sample range, or known standard deviation. It is applicable only when the normality of the measurements is assured.

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# FOREWORD

ASQ/ANSI Z1.9-2003 (R2018) is a reaffirmation of ASQ/ANSI Z1.9-2003 (R2013) with a few edits listed below.

ASQ/ANSI Z1.9-2003 (R2018) continues to allow complete interchangeability of the tabulated plans with ISO 3951-1, which provided a graphical means for implementation of the plans.

ASQ/ANSI Z1.9-2003 (R2018) is also roughly matched to ASQ/ANSI Z1.4-2003 (R2018), which corresponds directly to the old military standard MIL-STD-105D. The matching is sufficient to allow inspection under either standard for stated AQLs and inspection levels with reasonably equivalent protection. Tables are given in Section E—Appendix that show differences in protection between ASQ/ANSI Z1.9-2003 (R2018) and ASQ/ANSI Z1.4-2003 (R2018). These are for use in critical applications to determine whether moving from one standard to the other is appropriate.

# EDITS

| | | | |
|---|---|---|---|
| p. 33 | B6.2 | Inserted “)” before ”/” | |
| p. 45 | B-5 (cont) | Column 7, row .83 | Changed 29.97 to 20.97 |
| p. 45 | B-5 (cont) | Column 10, row .83 | Changed 29.68 to 20.68 |
| p. 47 | B-5 (cont) | Column 25, row 1.81 | Changed 31.6 to 3.16 |
| p. 48 | B-5 (cont) | Column 25, row 2.20 | Changed 1.160 to 1.061 |
| p. 94 | D-3 (cont) | Column 2.5, v, row I | Changed 0.149 to 1.049 |

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# INTRODUCTION

This standard was prepared to meet a need for the use of standard sampling plans for inspection by variables in procurement, supply and storage, and maintenance inspection operations. The variables sampling plans apply to a single quality characteristic which can be measured on a continuous scale, and for which quality is expressed in terms of percent nonconforming. The theory underlying the development of the variables sampling plans, including the operating characteristic curves, assumes that measurements of the quality characteristics are independent, identically normally distributed random variables.

*It is important to note that variables sampling plans are not to be used indiscriminately, simply because it is possible to obtain variables measurement data. The users are advised to consult their technical agency to determine the feasibility of application in considering applications where the normality or independence assumptions may be questioned.*

In comparison with attributes sampling plans, variables sampling plans have the advantage of usually resulting in considerable savings in sample size for comparable assurance as to the correctness of decisions in judging a single quality characteristic, or for the same sample size, greater assurance is obtained using variables plans. Attributes sampling plans have the advantage of greater simplicity, of being applicable to either single or multiple quality characteristics, and of requiring no knowledge about the distribution of the continuous measurements of any of the quality characteristics.

This standard is divided into four sections. Section A describes general procedures of the sampling plans. Sections B and C describe specific procedures and applications of the sampling plans when variability is unknown. In Section B the standard deviation is used as the basis for an estimate of the unknown variability, and in Section C the average range of the sample is used. Section D describes the plans when variability is known.

Each of Sections B, C, and D is divided into two parts: (I) Sampling Plans for the Single Specification Limit Case, and (II) Sampling Plans for the Double Specification Limit Case. For the single specification limit case, the acceptability criterion is given in two forms: Form 1 and Form 2. Either of the forms may be used, since they are identical as to sample size and decision for lot acceptability or rejectability. In deciding whether to use Form 1 or Form 2, the following points should be borne in mind. Form 1 provides the lot acceptability criterion without estimating lot percent nonconforming. The Form 2 lot acceptability criterion requires estimates of lot percent nonconforming.

Operating characteristic curves in Table A-3 are for the Normal Inspection sampling plans and show the relationship between quality and percent of lots expected to be accepted for the quality characteristic inspected. As stated, these operating characteristic curves are based on the assumption that measurements are selected at random from a normal distribution.

The corresponding sampling plans in Sections B, C, and D were matched as closely as possible under a system of fixed sample size with respect to their operating characteristic curves. Operating characteristic curves in Table A-3 have been computed for the sampling plans based on the standard deviation estimate of unknown variability. They are equally applicable for sampling plans based on the average range of the sample and those based on known variability.

Certain characteristics concerning the sampling plans in Section B and C and those in Section D should be noted. Plans based on the estimate of unknown variability require fewer sample units for comparable assurance when the standard deviation is used than when the average range of the sample is used. On the other hand, plans using the average range of the sample require simpler computations and may be better understood by operating personnel. Plans using known variability require considerably fewer sample units for comparable assurance than either of the plans of unknown variability; however, the requirement of known variability is a stringent one. The user is well advised to consult a statistician before applying sampling plans using known variability.



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Table B-6 provides values of the factor F to compute the maximum standard deviation: MSD. The MSD serves as a guide for the maximum allowable magnitude of the estimate of lot standard deviation when using plans for the double specification limit case, based on the standard deviation. Similarly Table C-6 provides values of the factor f to compute the maximum average range: MAR. The MAR serves as a guide for the maximum allowable magnitude of the average range of the sample when using plans for the double specification limit case, based on the average range. The estimate of lot standard deviation or average range of the sample, if it is less than the MSD or MAR, respectively, helps to ensure, but does not guarantee, lot acceptability.

All symbols and their definitions are given in the appendix of the applicable section. An illustration of the computations and procedures used in the sampling plans is given in the examples in Parts I and II of the applicable section. The computations involve simple arithmetic operations such as addition, subtraction, multiplication, and division of numbers, or at most, the taking of a square root of a number. The user should become familiar with the general procedures of Section A, and refer to the applicable section for detailed instructions regarding specific procedures, computations, and tables for the sampling plans.

Section E—Appendix provides information about the match between this variables standard, ASQ/ANSI Z1.9-2003 (R2018), and the corresponding attributes standard, ANSI/ASQ Z1.4-2008.

The flowchart in Figure 1 shows the basic procedure for using the standard.



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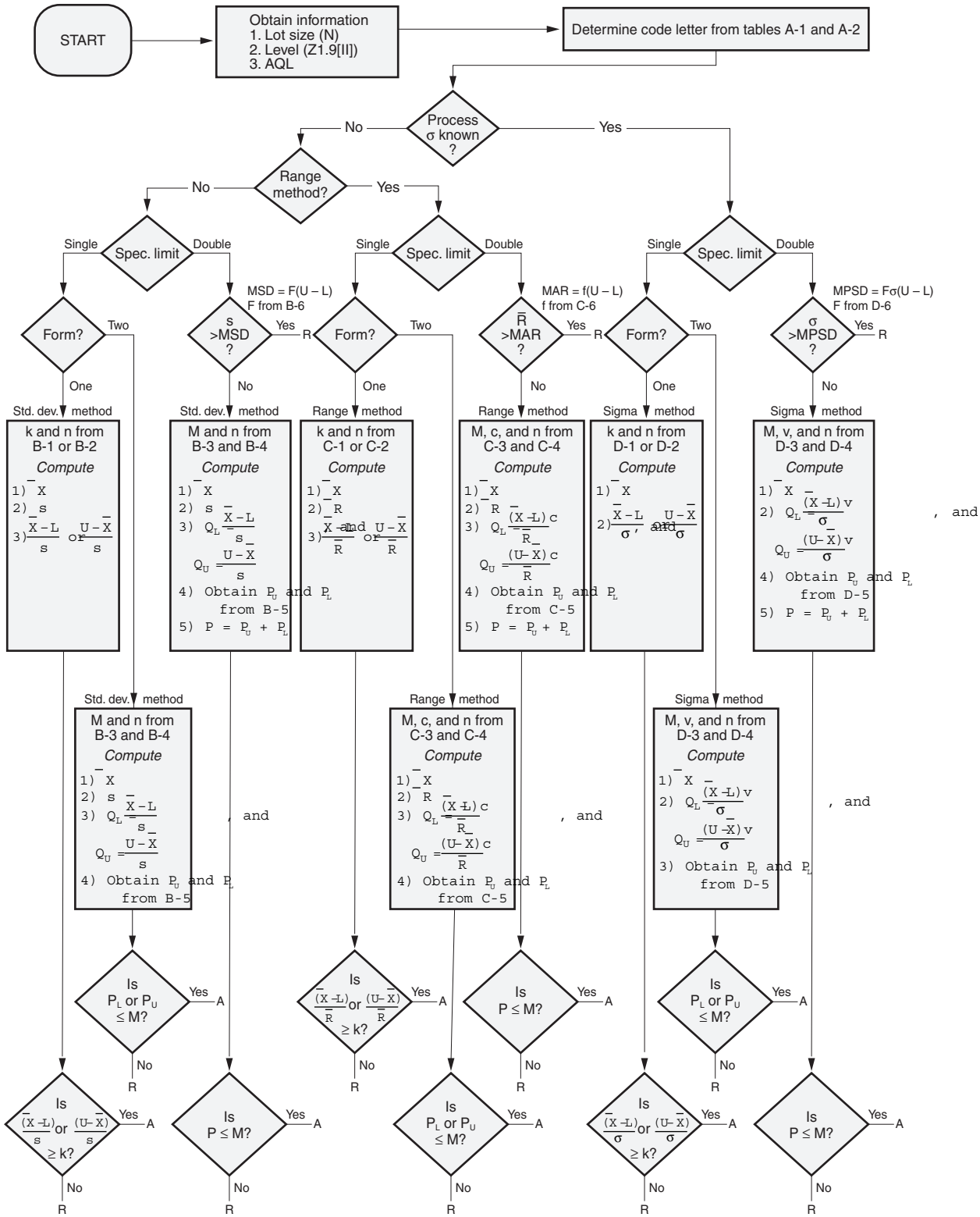


***Figure 1*** *Flowchart for use of ASQ/ANSI Z1.9-2003 (R2018).*



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# SECTION A

# GENERAL DESCRIPTION OF SAMPLING PLANS

## A1. SCOPE

A1.1 Purpose. This standard establishes sampling plans and procedures for inspection by variables for use in procurement, supply and storage, and maintenance inspection operations. When applicable this standard shall be referenced in the specification, contract, or inspection instructions, and the provisions set forth herein shall govern.

These acceptance sampling plans for variables are given in terms of the percent or proportion of product in a lot or batch that depart from some requirement. The general terminology used within the document will be given in terms of percent of nonconforming units or number of nonconformities, since these terms are likely to constitute the most widely used criteria for acceptance sampling.

## A2. DEFINITIONS AND TERMINOLOGY

For the purpose of this American National Standard, the definitions given in ANSI/ISO/ASQ A3534-2:2006 and the following definitions apply. The definitions and terminology employed in this standard are in accord with ANSI/ISO/ASQ A3534-2:2006 *Statistics—Vocabulary and symbols—Part 2: Applied Statistics.* Definitions quoted from ANSI/ISO/ASQ A3534-2:2006 reference the clause number of that standard.

A2.1 Acceptance Quality Limit (AQL): The AQL is the quality level that is the worst tolerable product average when a continuing series of lots is submitted for acceptance sampling.

NOTE
The use of the abbreviation AQL to mean Acceptable Quality Level is no longer recommended.

A2.2 Defect: Nonfulfillment of a requirement related to an intended or specified use [ISO 9000]. (See ANSI/ISO/ASQ A3534-2:2006 3.1.12)

NOTE 1
The distinction between the concepts defect and nonconformity is important as it has legal connotations, particularly those associated with product liability issues. Consequently the term defect should be used with extreme caution.

NOTE 2
The intended use by the customer can be affected by the nature of the information, such as operating or maintenance instructions, provided by the customer.

A2.3 Inspection by Variables: Inspection by measuring the magnitude(s) of the characteristic(s) of an item. (See ANSI/ISO/ASQ A3534-2:2006 4.1.4)

A2.4 Lot Size: The number of items in a lot.

A2.5 Mixed Variables-Attributes Inspection: Mixed variables-attributes inspection is inspection of a sample by attributes, in addition to inspection by variables already made of a previous sample from the lot, before a decision as to acceptability or rejectability of a lot can be made.

A2.6 Nonconformity: Nonfulfillment of a requirement [ISO 9000]. (See ANSI/ISO/ASQ A3534-2:2006 3.1.11)

NOTE
See notes to defect (A2.2)

A2.7 Sampling Plan: A specific plan which states the sample size(s) to be used and the associated criteria for accepting the lot.

NOTE
The sampling plan does not contain the rules on how to take the sample.

A2.8 Sampling Scheme: A combination of sampling plans with rules for changing from one plan to another.



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NOTE
Some schemes have switching rules for automatic change to tightened inspection plans or reduced inspection plans or change to 100 percent inspection.

A2.9 Switching Rule: Instruction within an acceptance sampling scheme for changing from one acceptance sampling plan to another of greater or lesser severity of sampling based on demonstrated quality level (See ANSI/ISO/ASQ A3534-2:2006 4.3.4)

EXAMPLE
Normal, tightened, reduced inspection or discontinuation of inspection are examples of severity of sampling.

A2.10 Specification Limit: Limiting value stated for a characteristic. (See ANSI/ISO/ASQ A3534-2:2006 3.1.3)

## A3. PERCENT NONCONFORMING

A3.1 Expression of Nonconformance. The extent of nonconformance of product shall be expressed in terms of percent nonconforming.

## A4. ACCEPTANCE QUALITY LIMIT

A4.1 Acceptance Quality Limit. The acceptance quality limit (AQL) represents a nominal value expressed in terms of percent nonconforming specified for a single quality characteristic. Certain numerical values of AQL ranging from .10 to 10.00 percent are shown in Table A-1. When a range of AQL values is specified, it shall be treated as if it were equal to the value of AQL for which sampling plans are furnished and which is included within the AQL range. When the specified AQL is a particular value other than those for which sampling plans are furnished, the AQL, which is to be used in applying the provisions of this standard, shall be as shown in Table A-1.

A4.2 Note on the Meaning of AQL. The concept of AQL only applies when an acceptance sampling scheme with rules for switching between normal, tightened, and reduced inspection and discontinuance of sampling inspection is used. These rules are designed to encourage suppliers to have process averages consistently better than the AQL. If suppliers fail to do so, there is a high probability of being switched from normal inspection to tightened inspection where lot acceptance becomes more difficult. Once on tightened inspection, unless corrective action is taken to improve product quality, it is very likely that the rule requiring discontinuance of sampling inspection will be invoked.

Although individual lots with quality as bad as the AQL can be accepted with fairly high probability, the designation of an AQL does not suggest that this is necessarily a desirable quality level. The AQL is a parameter of the sampling scheme and should not be confused with a process average, which describes the operating level of a manufacturing process. It is expected that the product quality level will be less than the AQL to avoid excessive non-accepted lots.

The sampling plans in this standard are so arranged that the probability of lot acceptance at the designated AQL depends upon sample size, being generally higher for large samples than for small samples for a given AQL. To determine the specific protection to the consumer at a given AQL, it is necessary to refer to the operating characteristic curves (which are provided in this standard) of the corresponding scheme and its constituent plans.

The AQL alone does not describe the protection to the consumer for individual lots or batches, but more directly relates to what is expected from a series of lots or batches provided the provisions of this standard are satisfied.

A4.3 Specifying AQLs. The particular AQL value to be used for a single quality characteristic of a given product must be specified. In the case of a double specification limit, either an AQL value is specified for the total percent nonconforming outside of both upper and lower specification limits, or two AQL values are specified, one for the upper limit and another for the lower limit.

## A5. SUBMITTAL OF PRODUCT

A5.1 Lot. The term “lot” shall mean “inspection lot.”



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A5.1.1 Formation of Lots. Each lot shall, as far as is practicable, consist of units of product of a single type, grade, class, size, or composition manufactured under essentially the same conditions.

A5.1.2 Lot Size. The lot size may differ from the quantity designated in the contract or order as a lot for production, shipment, or other purposes.

## A6. LOT ACCEPTABILITY

A6.1 Acceptability Criterion. The acceptability of a lot of material submitted for inspection shall be determined by use of one of the sampling plans associated with a specified value of the AQL(s). This standard provides sampling plans based on known and unknown variability. In the latter case two alternative methods are provided, one based on the estimate of lot standard deviation and the other on the average range of the sample. These are referred to as the standard deviation method and the range method. For the case of a single specification limit, the acceptability criterion is given in two forms. These are identified as Form 1 and Form 2.

A6.2 Choice of Sampling Plans. Sampling plans and procedures are provided in Section B if variability is unknown and the standard deviation method is used, in Section C if variability is unknown and the range method is used, and in Section D if variability is known. Unless otherwise specified, unknown variability, standard deviation method sampling plans, and the acceptability criterion of Form 2 (for the single specification limit case) shall be used.

## A7. SAMPLE SELECTION

A7.1 Determination of Sample Size. The sample size code letter depends on the inspection level and the lot size. There are five inspection levels: Special Levels S3, S4, and General Levels I, II, and III. Unless otherwise specified, Inspection Level II shall be used. However, Inspection Level I may be specified when less discrimination is needed, or Level III may be specified for greater discrimination. Levels S3 and S4 may be used when relatively small sample sizes are necessary and large sampling risks can or must be tolerated. The sample size code letter applicable to the specified inspection level and for lots of given size shall be obtained from Table A-2.

A7.2 Drawings of Samples. Units of the sample shall be selected at random without regard to their quality.

## A8. NORMALITY ASSUMPTION

This standard assumes the underlying distribution of individual measurements to be normal in shape. Failure of this assumption to be valid will affect the OC curves and probabilities based on these curves. In particular it will affect the estimate of percent nonconforming calculated from the mean and standard deviation of the distribution. The assumption should be verified prior to use of this standard.

A variety of statistical tests and graphical techniques are available for this purpose. A person knowledgeable in statistics should be consulted who can advise whether the distribution appears suitable for sampling by variables.

## A9. SPECIAL PROCEDURE FOR APPLICATION OF MIXED VARIABLES-ATTRIBUTES SAMPLING PLANS

A9.1 Applicability. A mixed variables and attributes sampling plan may be used under either of the two following conditions: (Note: No operating characteristic curves are provided for the mixed variables-attributes sampling plans herein and those in Table A-3 are not applicable.)

Condition A. Ample evidence exists that the product submitted for inspection is selected by the supplier to meet the specification limit(s) by a screening process from a larger quantity of product which is not being produced within the specification limit(s).

Condition B. Other conditions exist that warrant the use of a variables-attributes sampling plan.

A9.2 Selection of Sampling Plans. The mixed variables-attributes sampling plan shall be selected in accordance with the following:



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A9.2.1 Select the variables sampling plan in accordance with Section B, C, or D.

A9.2.2 Select the attributes sampling plan from ANSI Z1.4 using a single sampling plan and tightened inspection. The same AQL value(s) shall be used for the attributes sampling plan as used for the variables plan of paragraph A9.2.1 (Additional sample items may be drawn, as necessary, to satisfy the requirements for sample size of the attributes sampling plan. Count as a nonconforming unit each sample item falling outside of specification limit(s).)

A9.3 Determination of Acceptability. A lot meets the acceptability criterion if one of the following conditions is satisfied:

Condition A. The lot complies with the appropriate variables acceptability criterion of Section B, C, or D.

Condition B. The lot complies with the acceptability criterion of ANSI/ASQ Z1.4-2008.

A9.3.1 If Condition A is not satisfied, proceed in accordance with the attributes sampling plan to meet Condition B.

A9.3.2 If Condition B is not satisfied, the lot does not meet the acceptability criterion.

## A10. NORMAL, TIGHTENED, AND REDUCED INSPECTION

A10.1 Initiation of Inspection. Normal inspection will be used at the start of inspection unless otherwise directed by the responsible authority.

A10.2 Continuation of Inspection. Normal, tightened, or reduced inspection shall continue unchanged on successive lots or batches except where the following switching procedures require change.

A10.3 Switching Procedures.

A10.3.1 Normal to Tightened. When normal inspection is in effect, tightened inspection shall be instituted when two out of five consecutive lots or batches have been rejected on original inspection (that is, ignoring resubmitted lots or batches for this procedure).

A10.3.2 Tightened to Normal. When tightened inspection is in effect, normal inspection shall be instituted when five consecutive lots or batches have been considered acceptable on original inspection.

A10.3.3 Normal to Reduced. When normal inspection is in effect, reduced inspection shall be instituted providing that all of the following conditions are satisfied:

a. The preceding 10 lots or batches have been on normal inspection and none has been rejected; and
b. Production is at a steady rate; and
c. Reduced inspection is considered desirable by the responsible authority and is permitted by the contract or specification.

A10.3.4 Reduced to Normal. When reduced inspection is in effect, normal inspection shall be instituted if any of the following occur on original inspection:

a. A lot or batch is rejected; or
b. Production becomes irregular or delayed; or
c. Other conditions warrant that normal inspection shall be instituted.

A10.4 Discontinuation of Inspection. If the cumulative number of lots not accepted in a sequence of consecutive lots on tightened inspection reaches 5, 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 A10.3.1 had been invoked.



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*Table A-1*
AQL Conversion Table

| For specified AOL values falling within these ranges | | | Use this AQL value |
|---|---|---|---|
| – | to | 0.109 | 0.10 |
| 0.110 | to | 0.164 | 0.15 |
| 0.165 | to | 0.279 | 0.25 |
| 0.280 | to | 0.439 | 0.40 |
| 0.440 | to | 0.669 | 0.65 |
| 0.700 | to | 1.09 | 1.0 |
| 1.10 | to | 1.64 | 1.5 |
| 1.65 | to | 2.79 | 2.5 |
| 2.80 | to | 4.39 | 4.0 |
| 4.40 | to | 6.99 | 6.5 |
| 7.00 | to | 10.9 | 10.0 |



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*Table A-2*[1]
Sample Size Code Letters[2]

| Lot Size | | | Inspection Levels | | | | |
|---|---|---|---|---|---|---|---|
| | | | Special | | General | | |
| | | | S3 | S4 | I | II | III |
| 2 | to | 8 | B | B | B | B | C |
| 9 | to | 15 | B | B | B | B | D |
| 16 | to | 25 | B | B | B | C | E |
| 26 | to | 50 | B | B | C | D | F |
| 51 | to | 90 | B | B | D | E | G |
| 91 | to | 150 | B | C | E | F | H |
| 151 | to | 280 | B | D | F | G | I |
| 281 | to | 400 | C | E | G | H | J |
| 401 | to | 500 | C | E | G | I | J |
| 501 | to | 1,200 | D | F | H | J | K |
| 1,201 | to | 3,200 | E | G | I | K | L |
| 3,201 | to | 10,000 | F | H | J | L | M |
| 10,001 | to | 35,000 | G | I | K | M | N |
| 35,001 | to | 150,000 | H | J | L | N | P |
| 150,001 | to | 500,000 | H | K | M | P | P |
| 500,001 | and | over | H | K | N | P | P |

[1]The theory governing inspection by variables depends on the properties of the normal distribution and, therefore, this method of inspection is only applicable when there is reason to believe that the frequency distribution is normal.

[2]Sample size code letters given in body of table are applicable when the indicated inspection levels are to be used.



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*Table A-3*
Operating Characteristic Curves for Sampling Plans
of Sections B, C, and D



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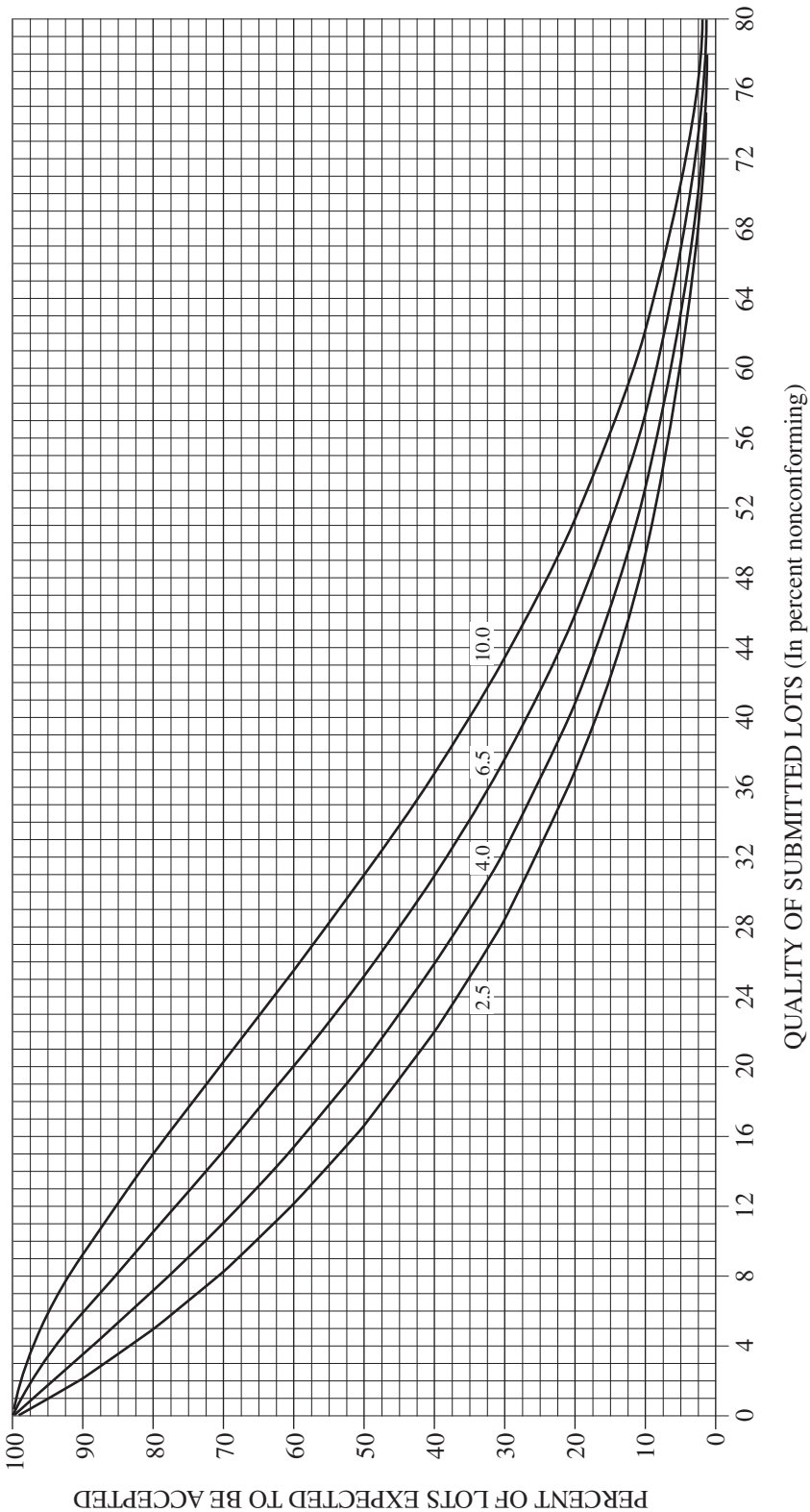
*Table A-3*

## Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

### Sample Size Code Letter B

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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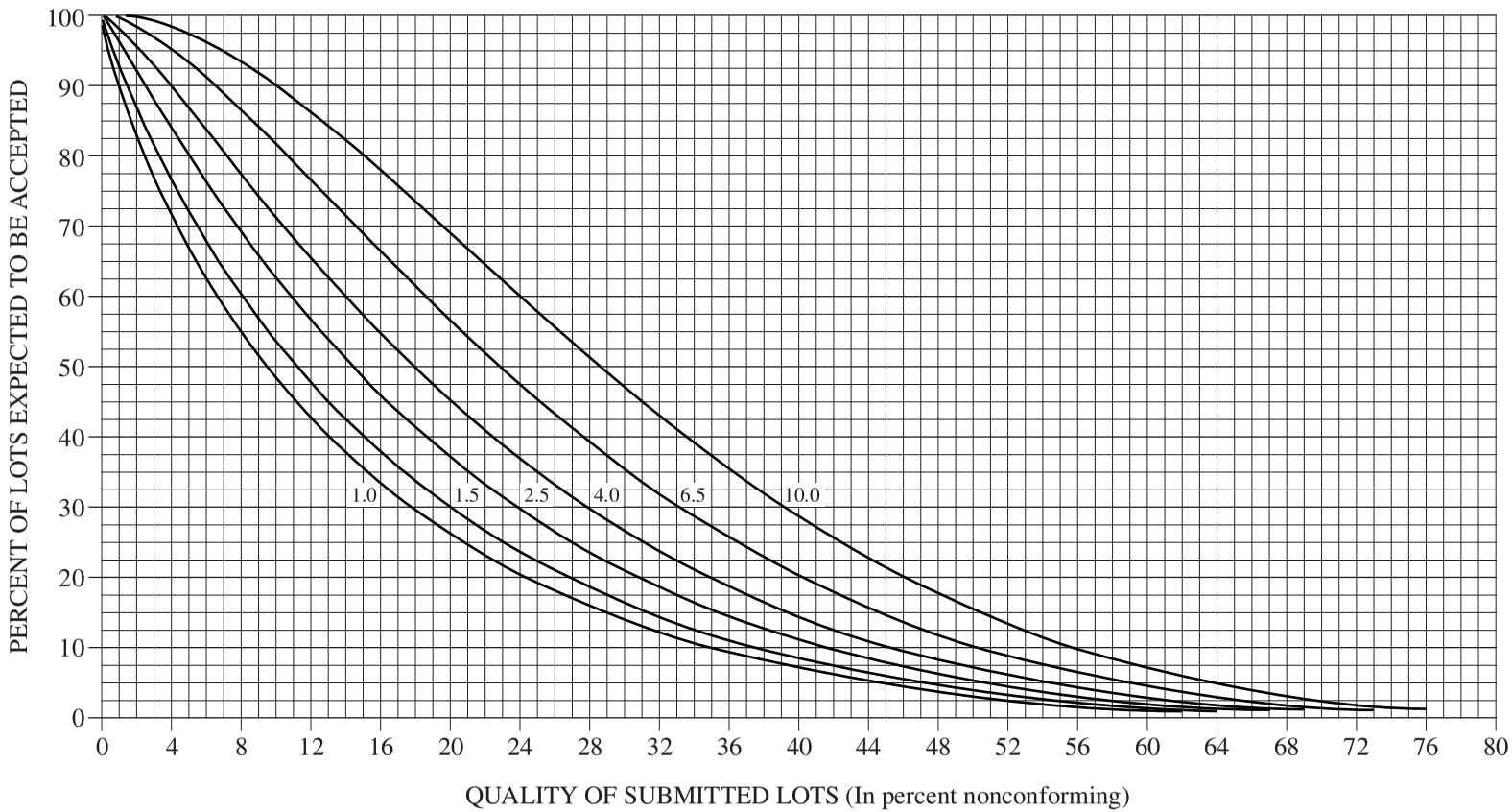
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter C

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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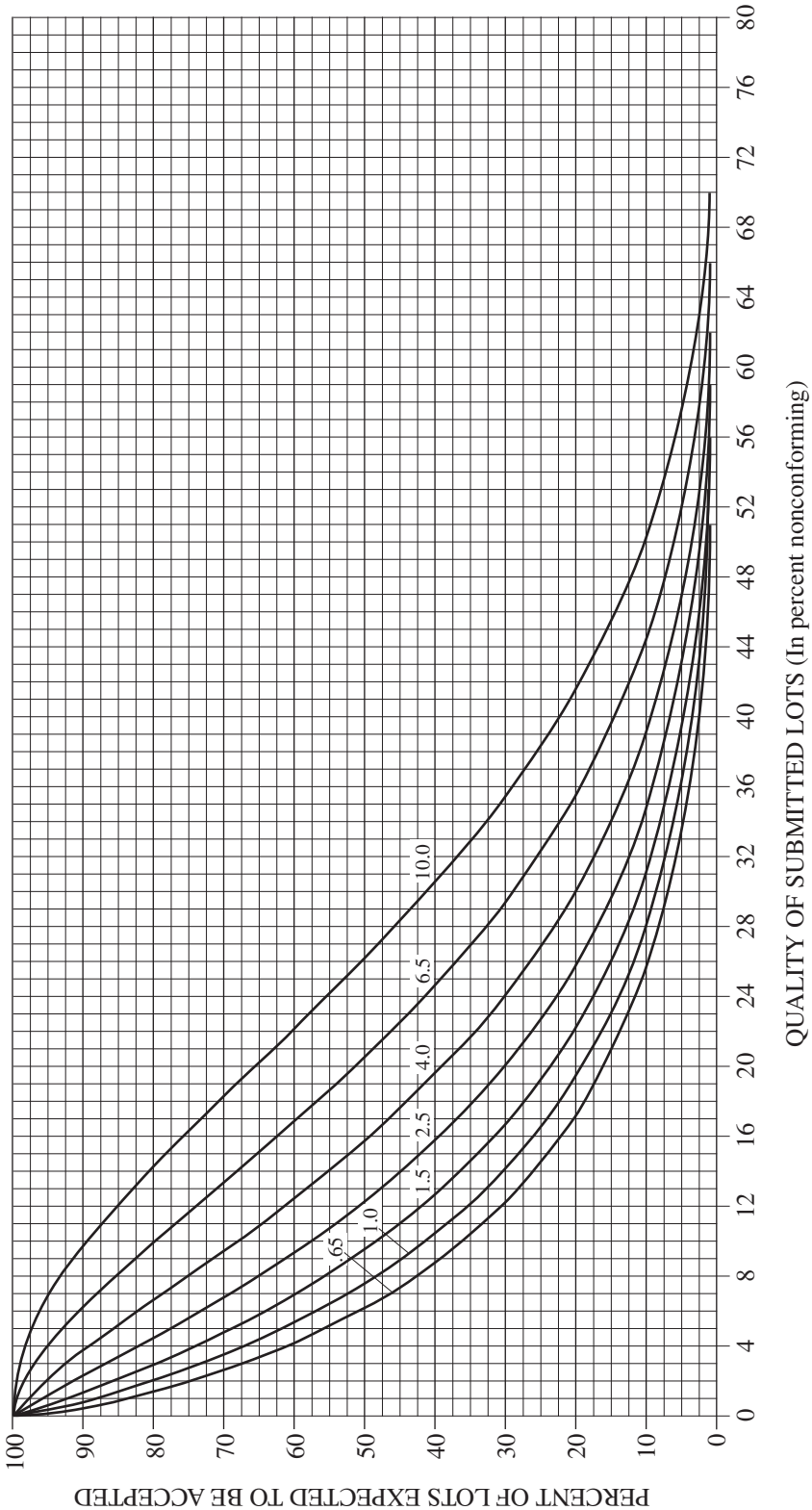
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

Sample Size Code Letter D

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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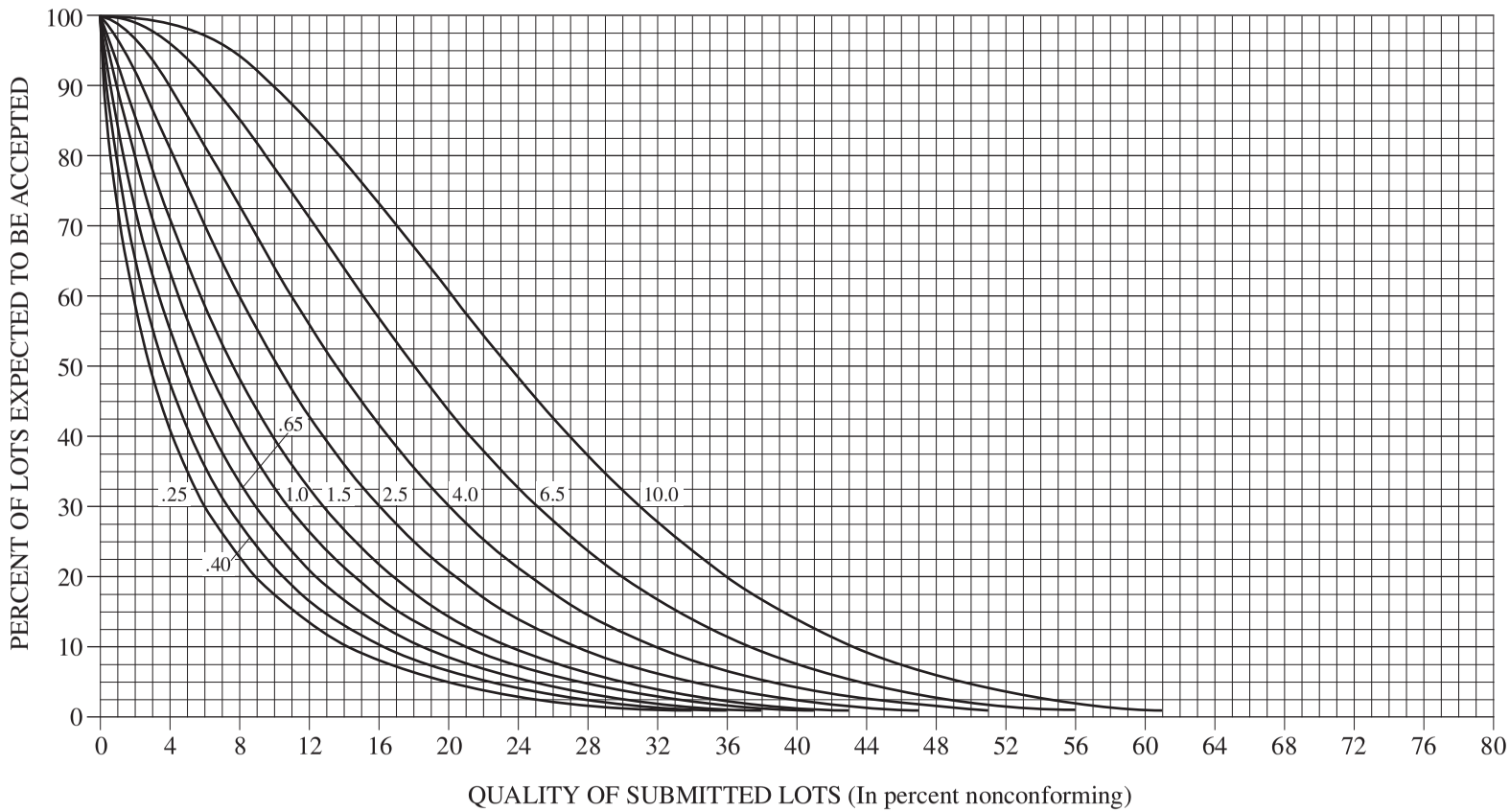
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter E

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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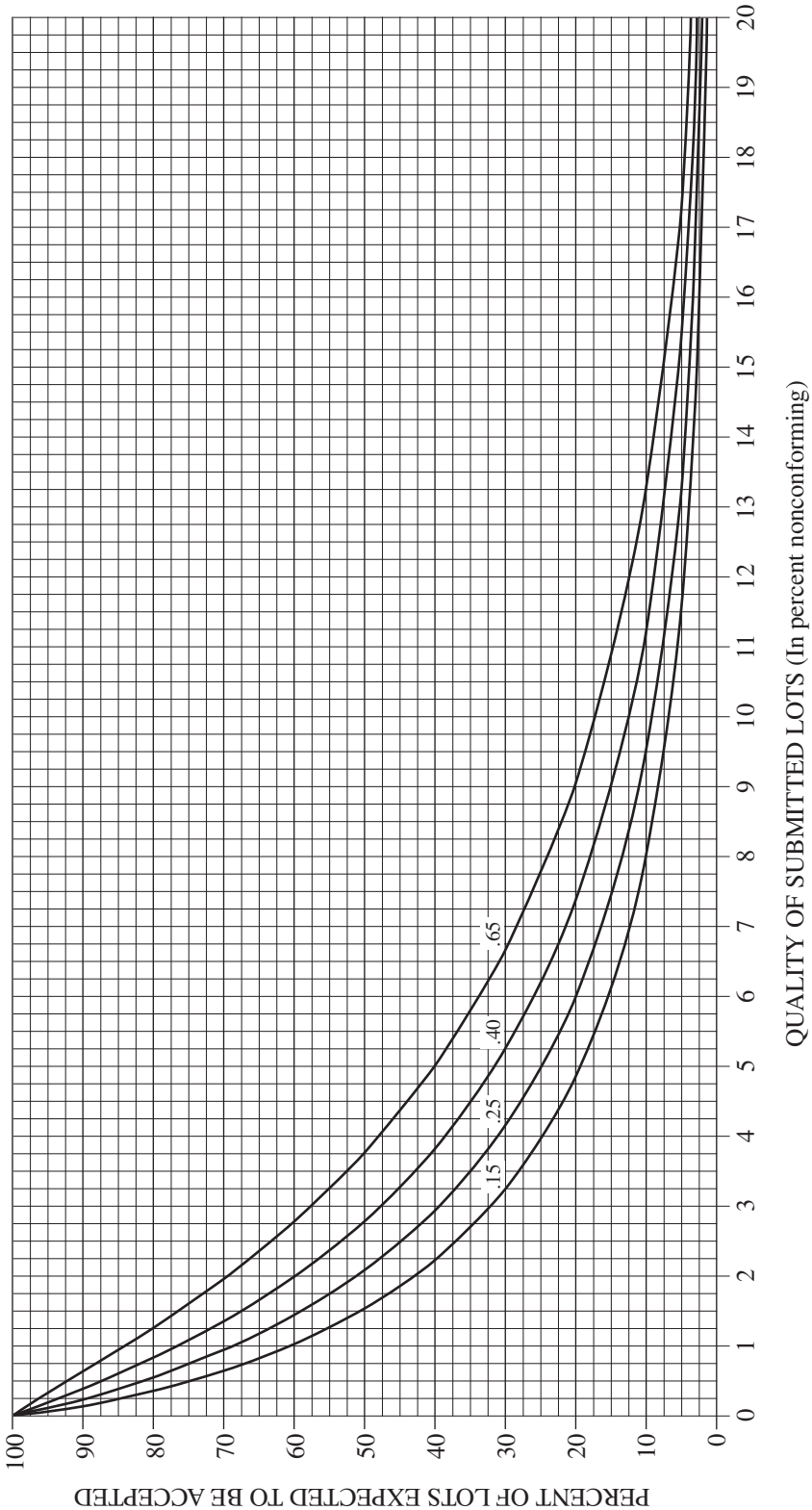
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

Sample Size Code Letter F

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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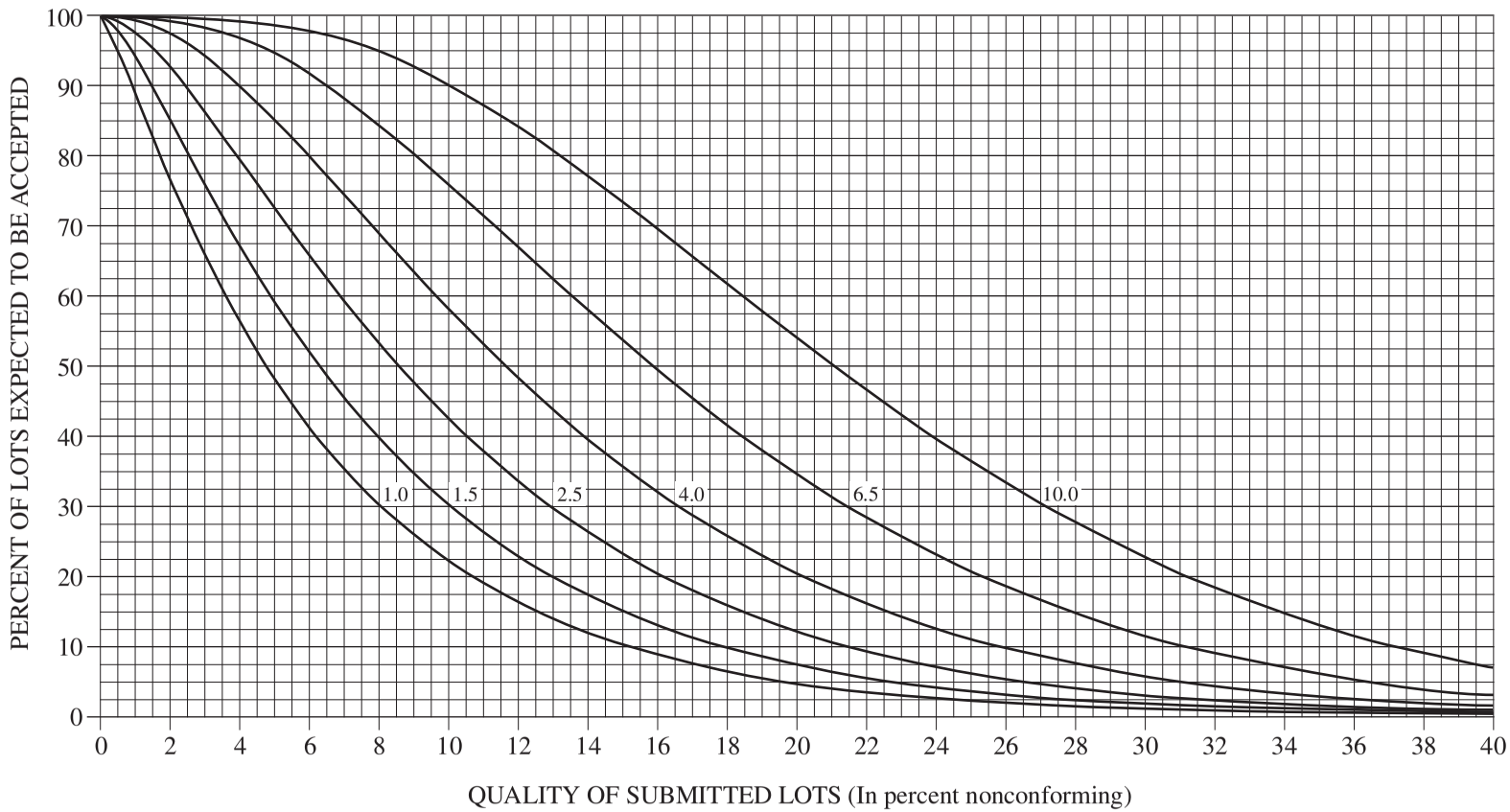
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter F (Continued)

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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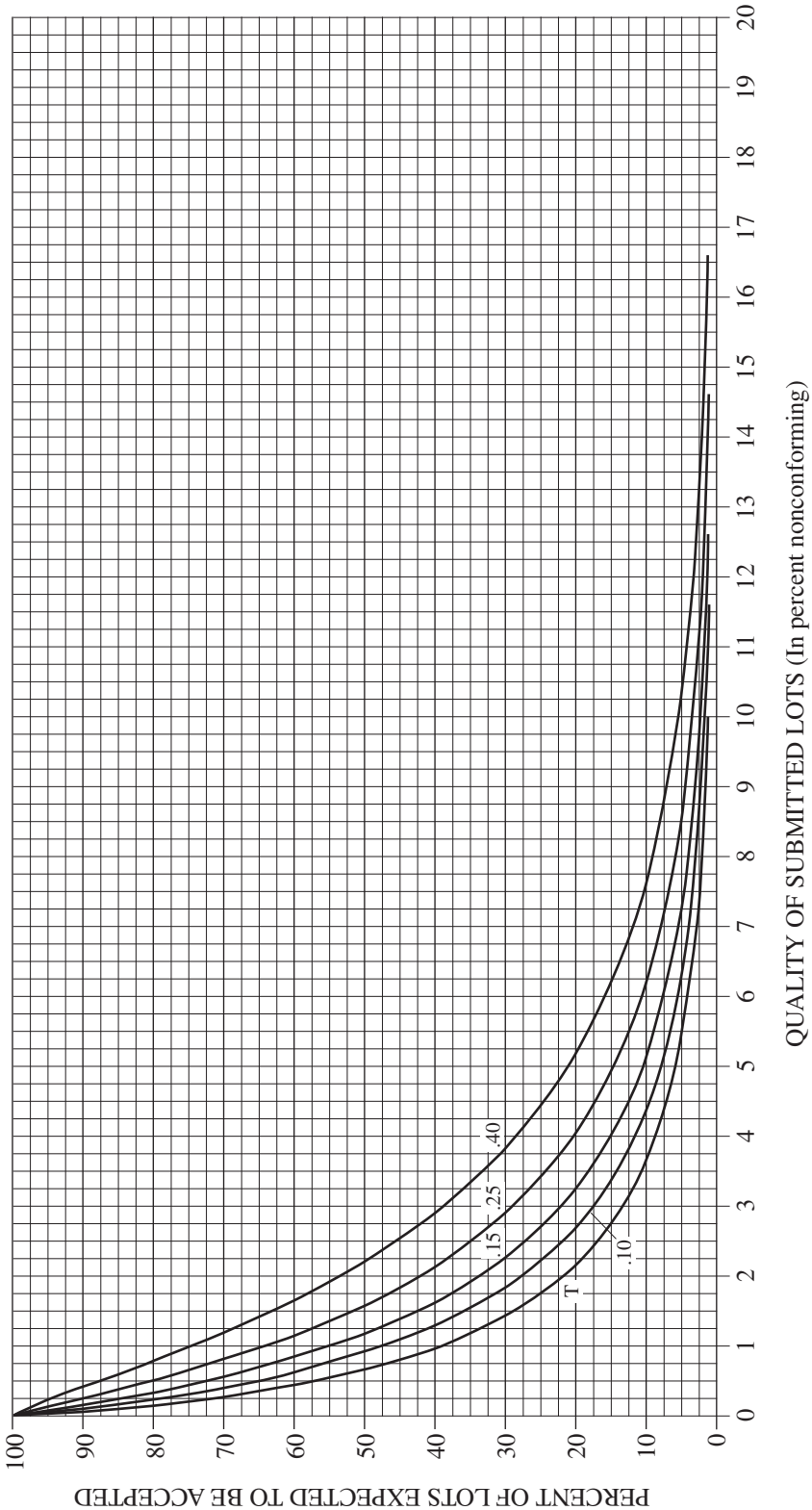
*Table A-3*

## Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

### Sample Size Code Letter G

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. T denotes plan used exclusively on tightened inspection and provides symbol for identification of appropriate OC curve. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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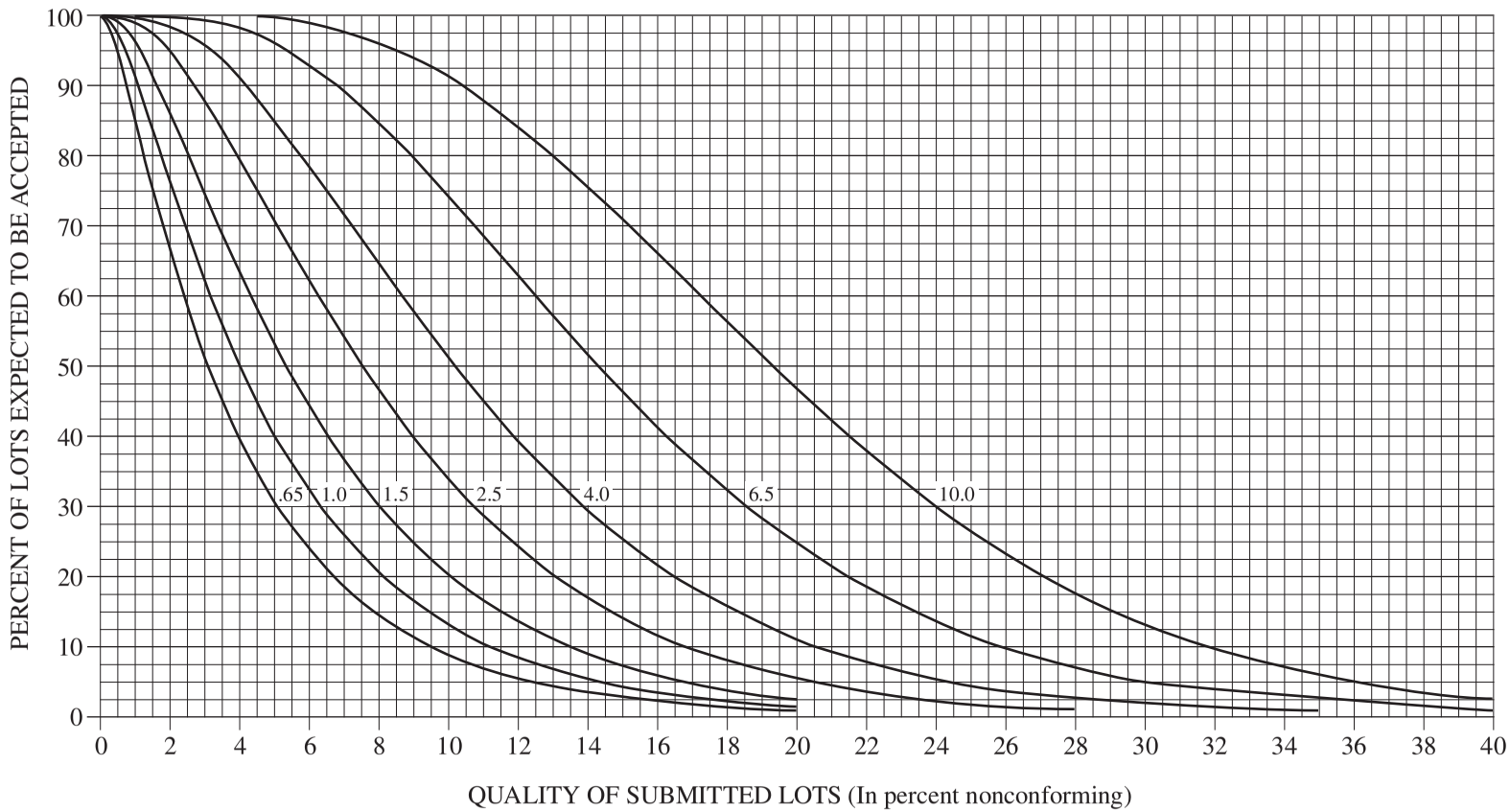
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter G (Continued)

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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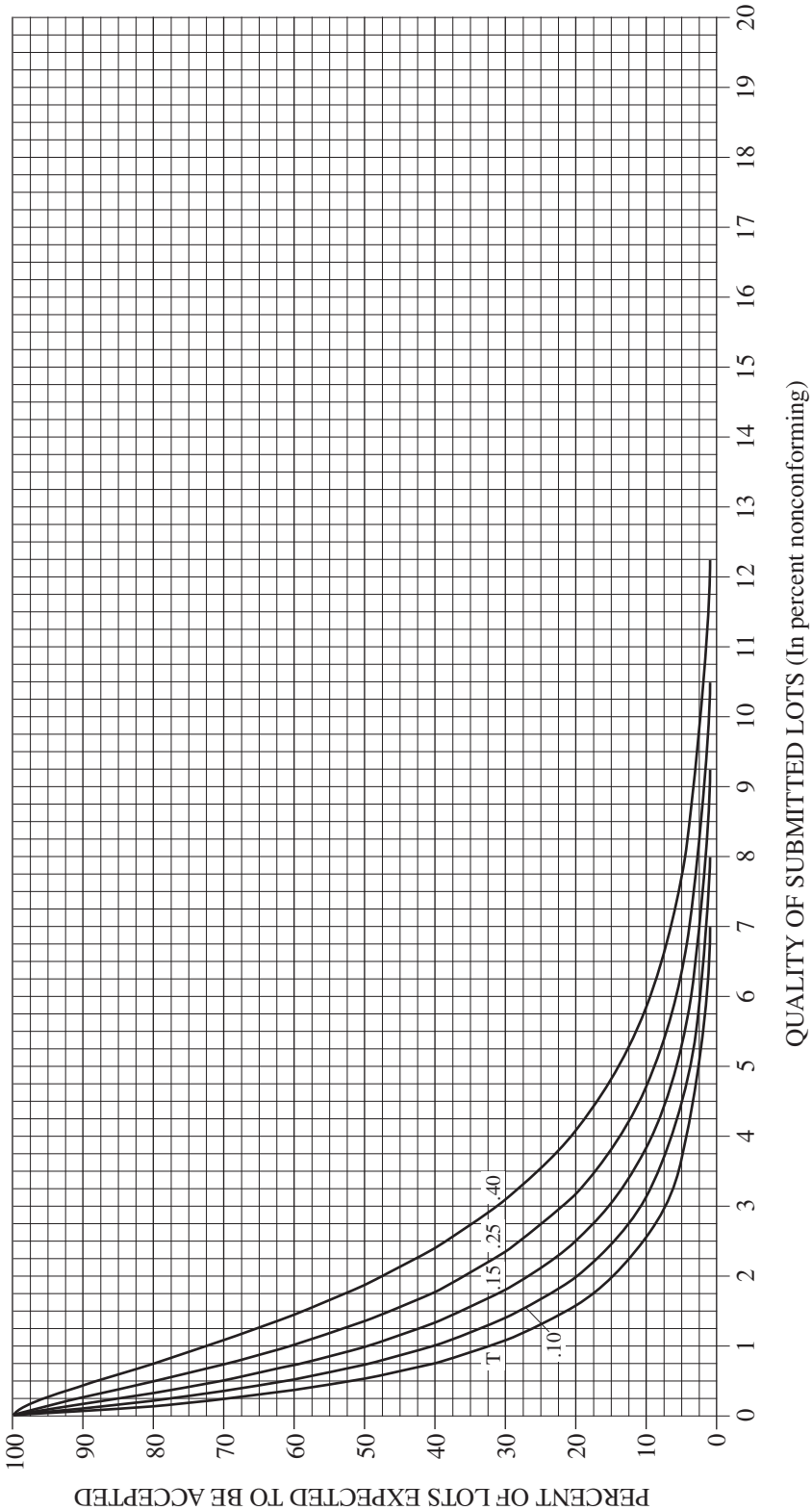
*Table A-3*

## Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

### Sample Size Code Letter H

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. T denotes plan used exclusively on tightened inspection and provides symbol for identification of appropriate OC curve. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter H (Continued)

(Curves for sampling plans based on range method and known variability are essentially equivalent)

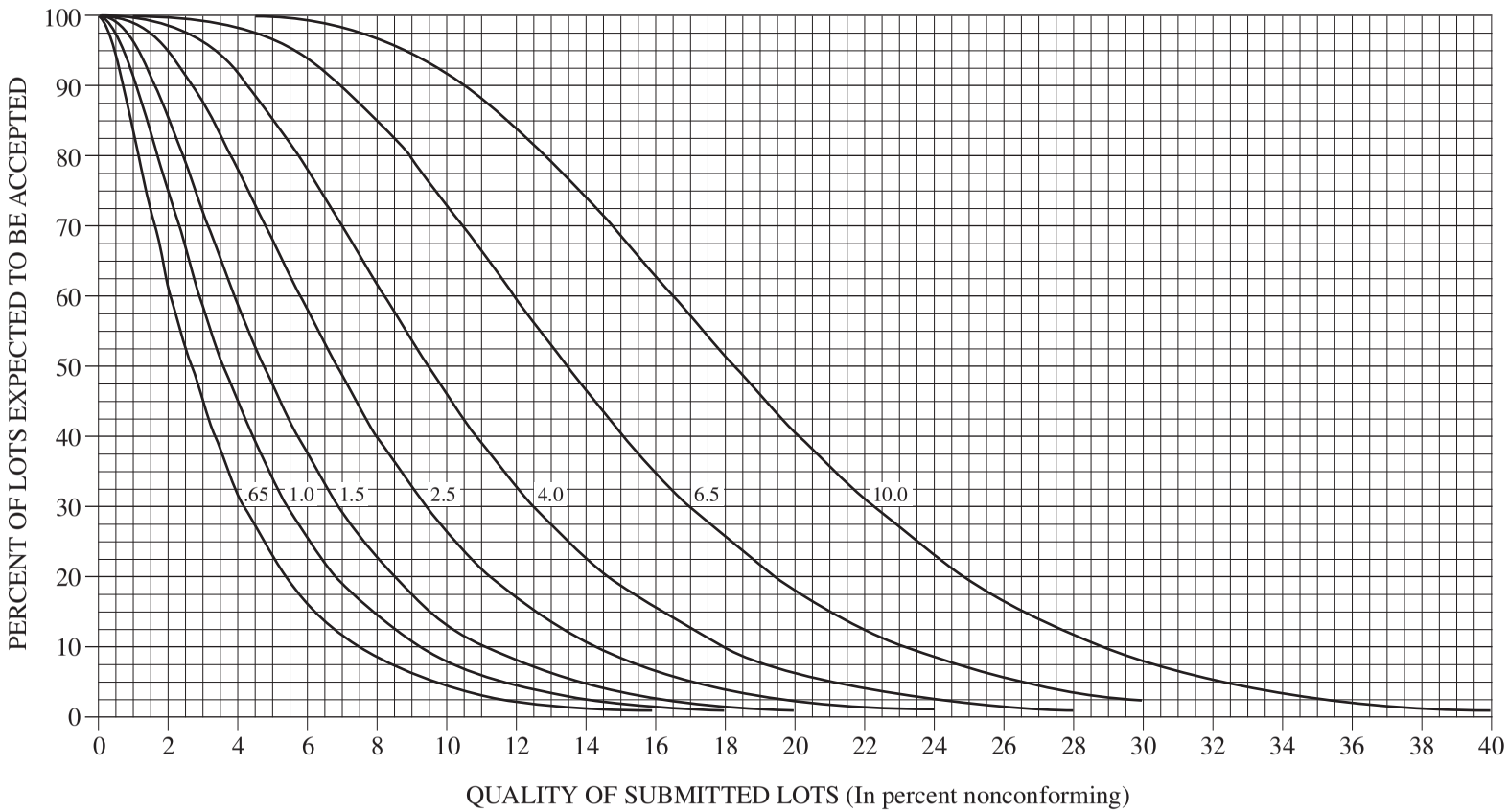


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*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

Sample Size Code Letter I

(Curves for sampling plans based on range method and known variability are essentially equivalent)

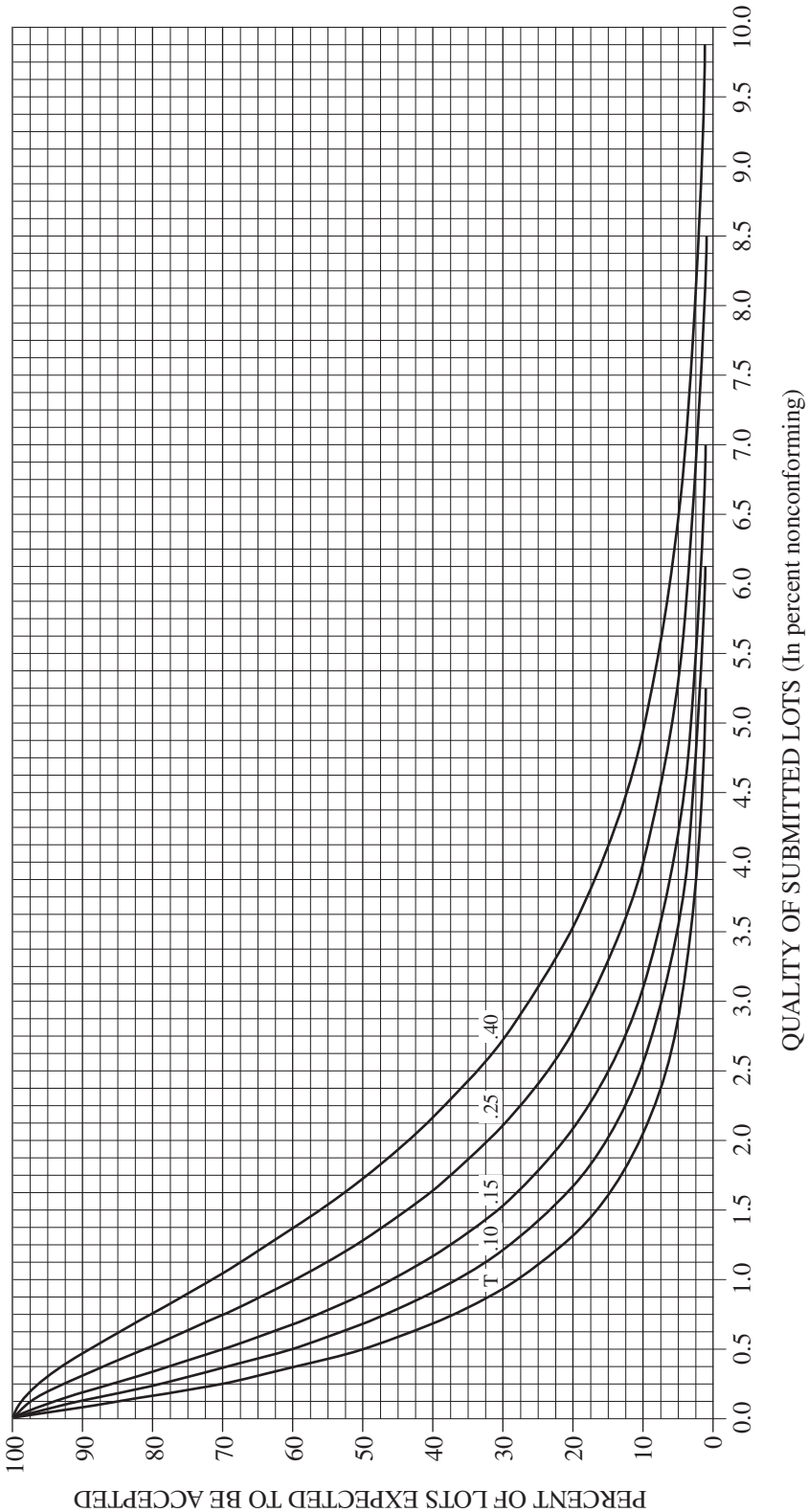


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*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter I (Continued)

(Curves for sampling plans based on range method and known variability are essentially equivalent)

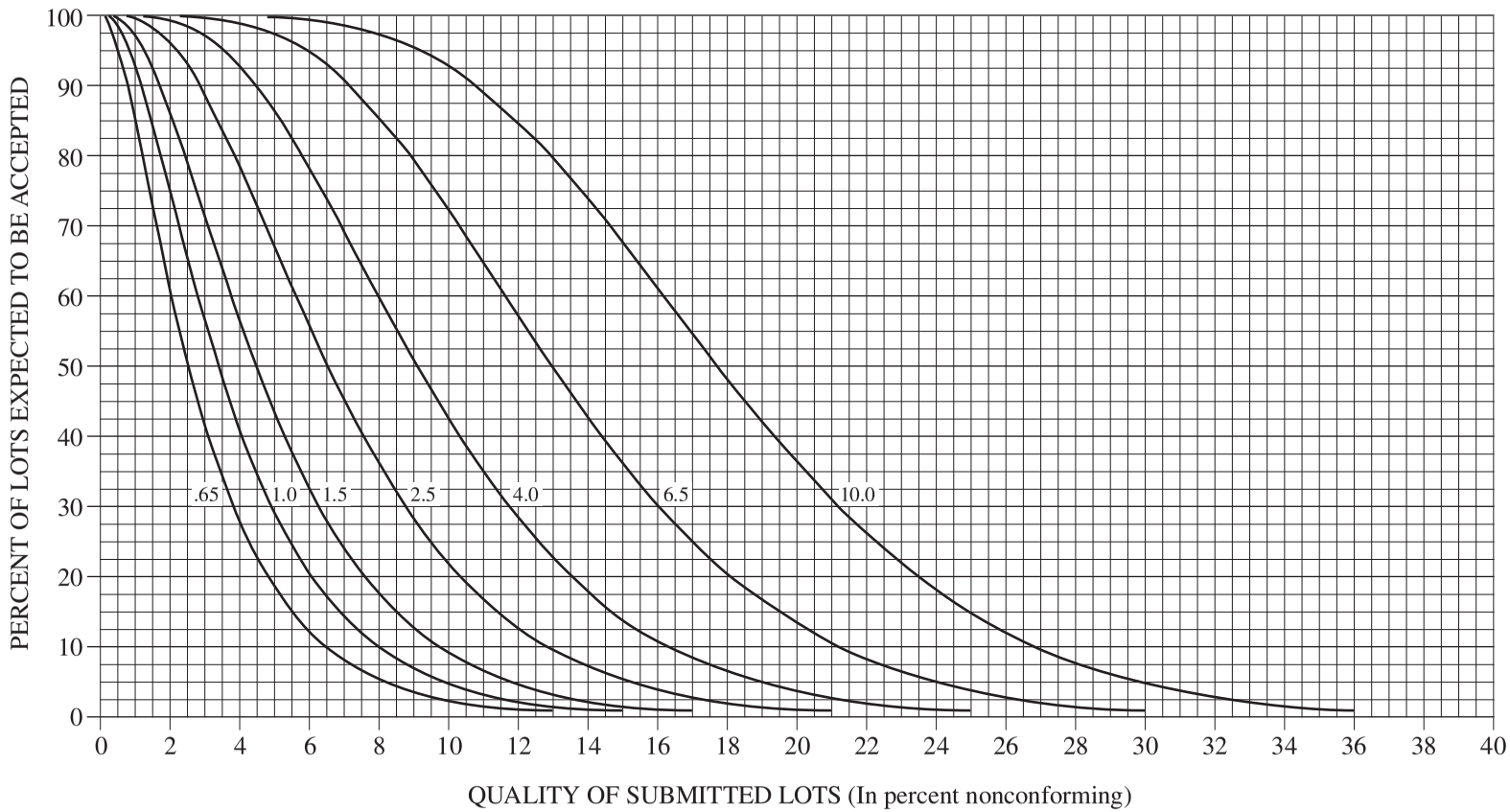


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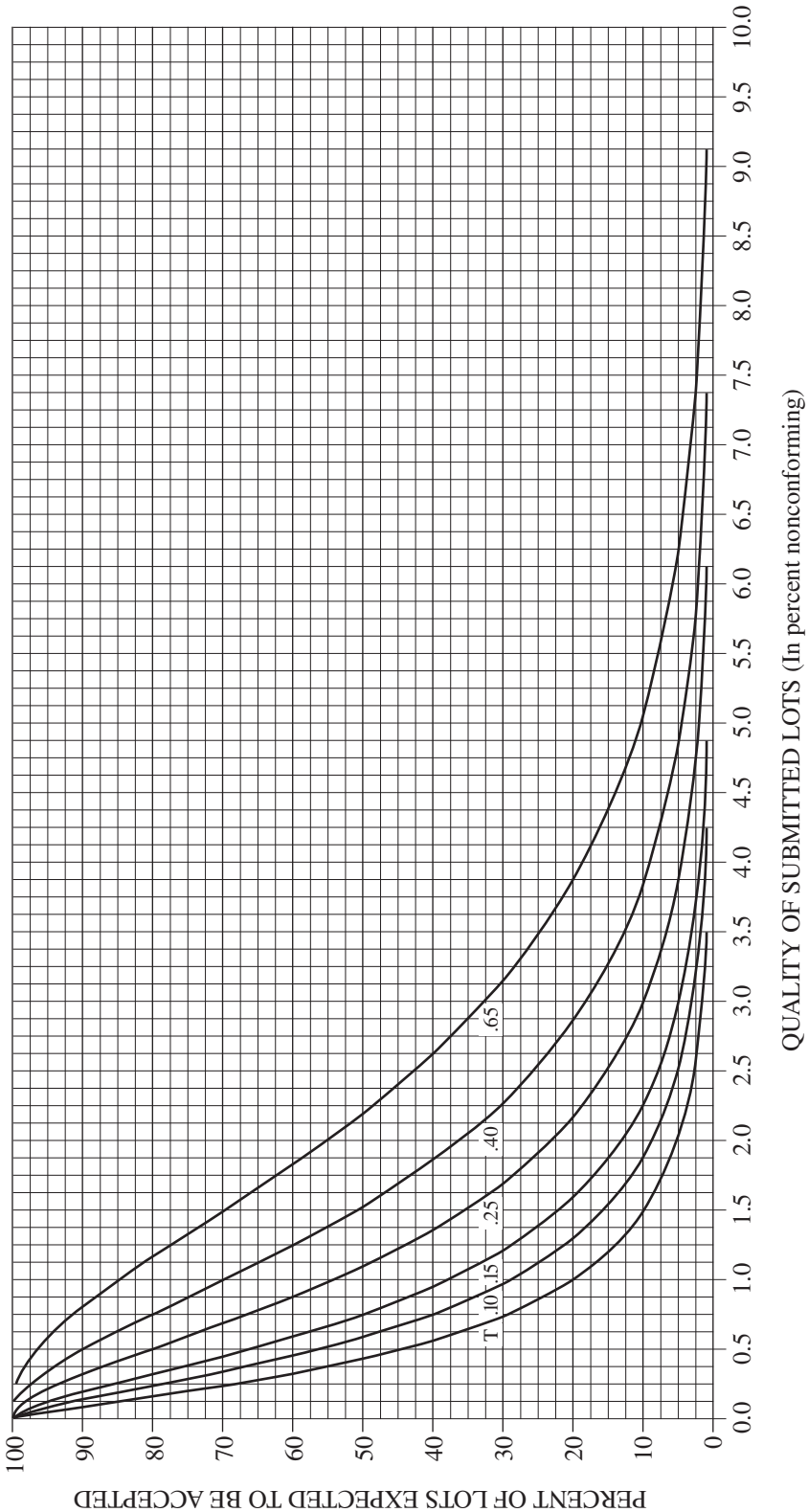
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

Sample Size Code Letter J

(Curves for sampling plans based on range method and known variability are essentially equivalent)

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Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter J (Continued)

(Curves for sampling plans based on range method and known variability are essentially equivalent)

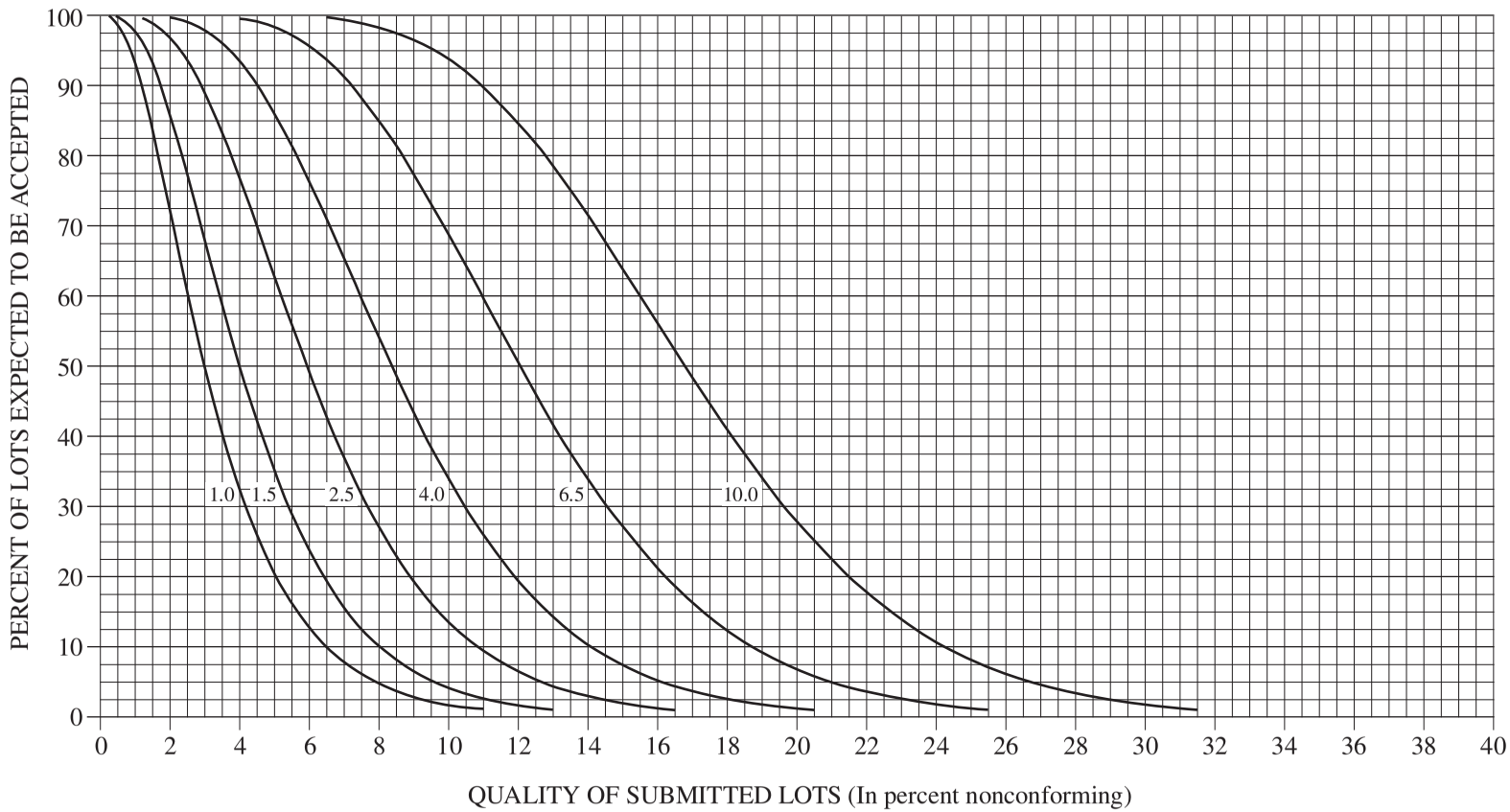


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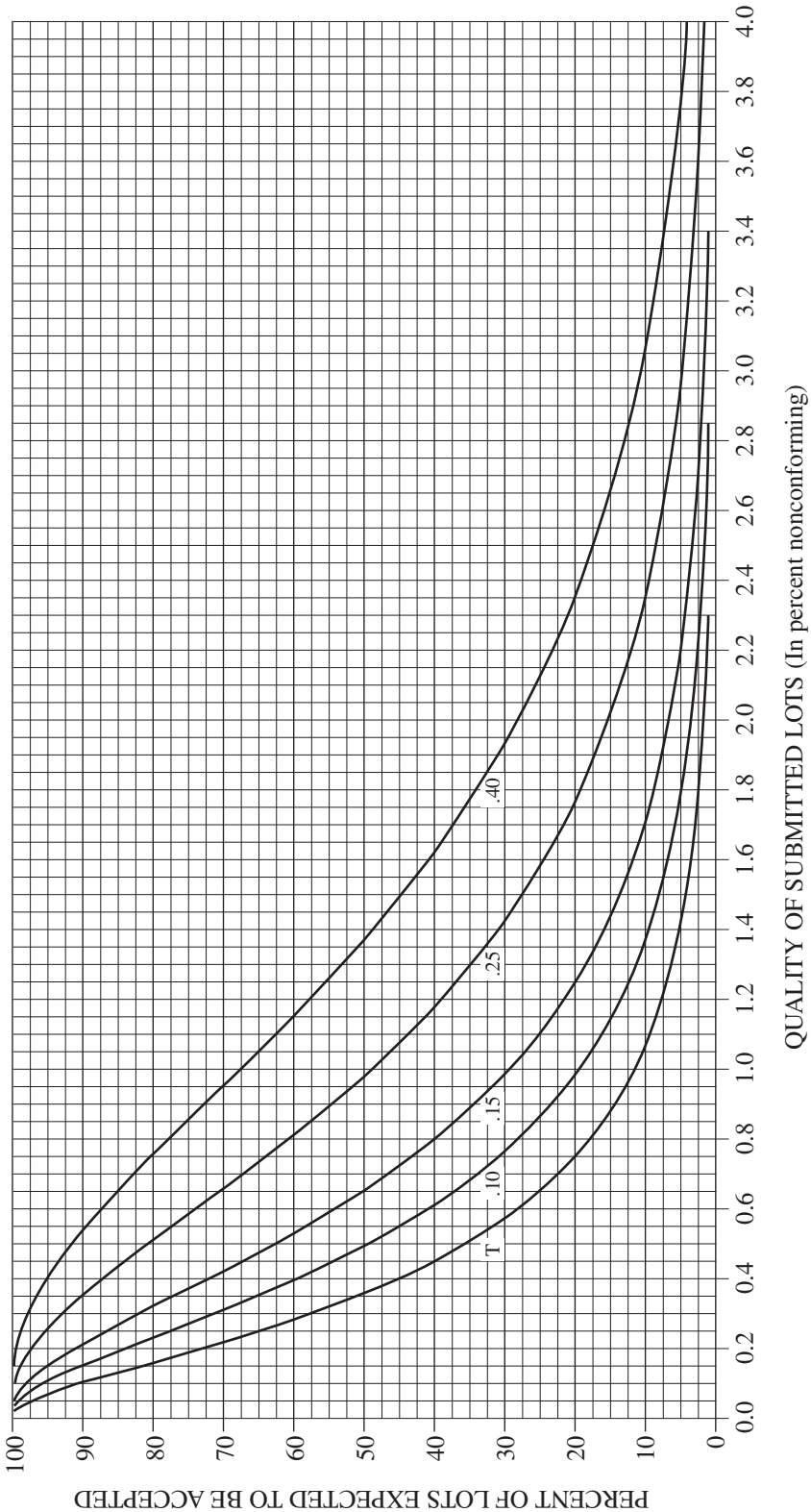
*Table A-3*

## Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

### Sample Size Code Letter K

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. T denotes plan used exclusively on tightened inspection and provides symbol for identification of appropriate OC curve. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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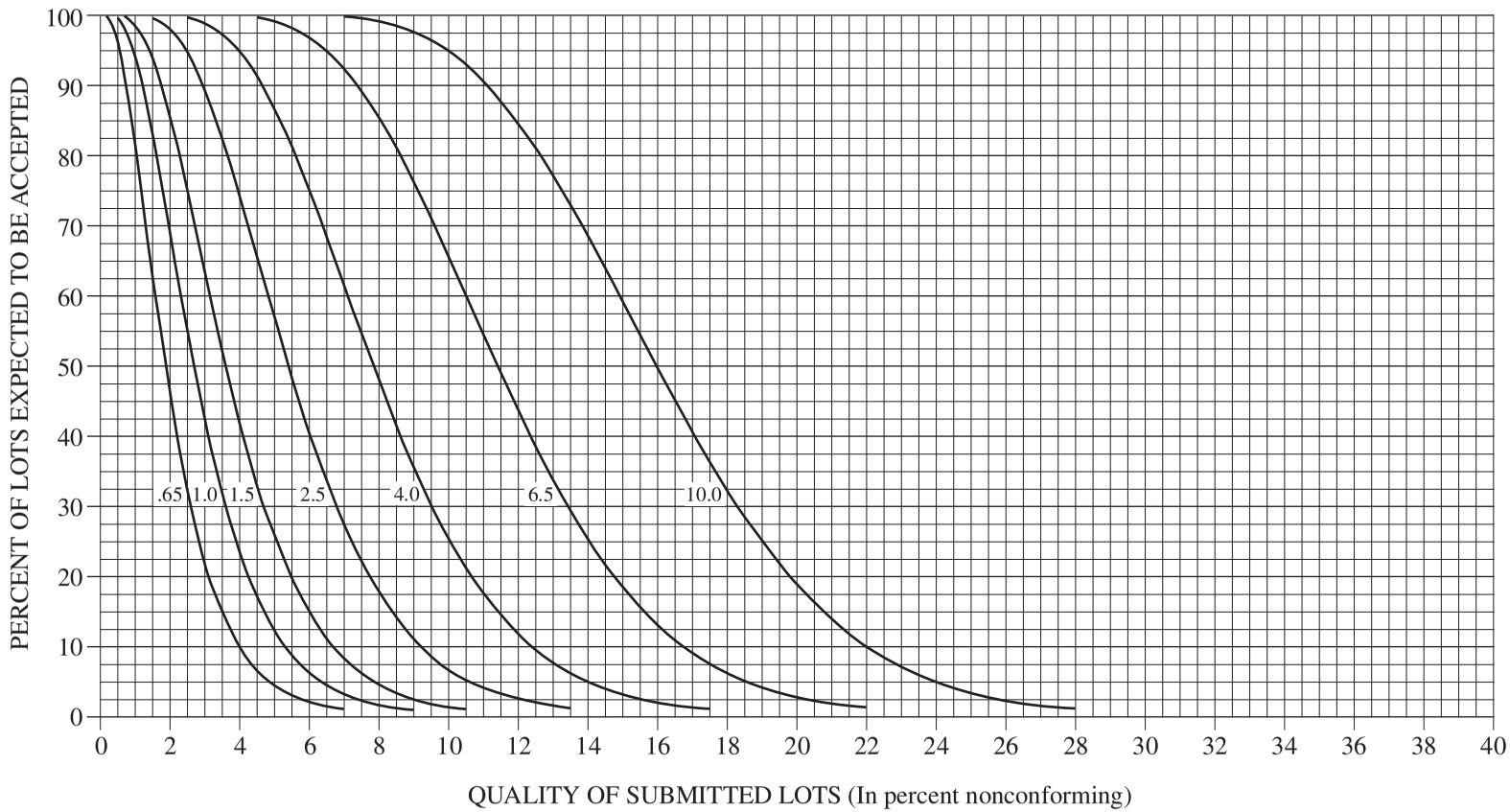
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter K (Continued)

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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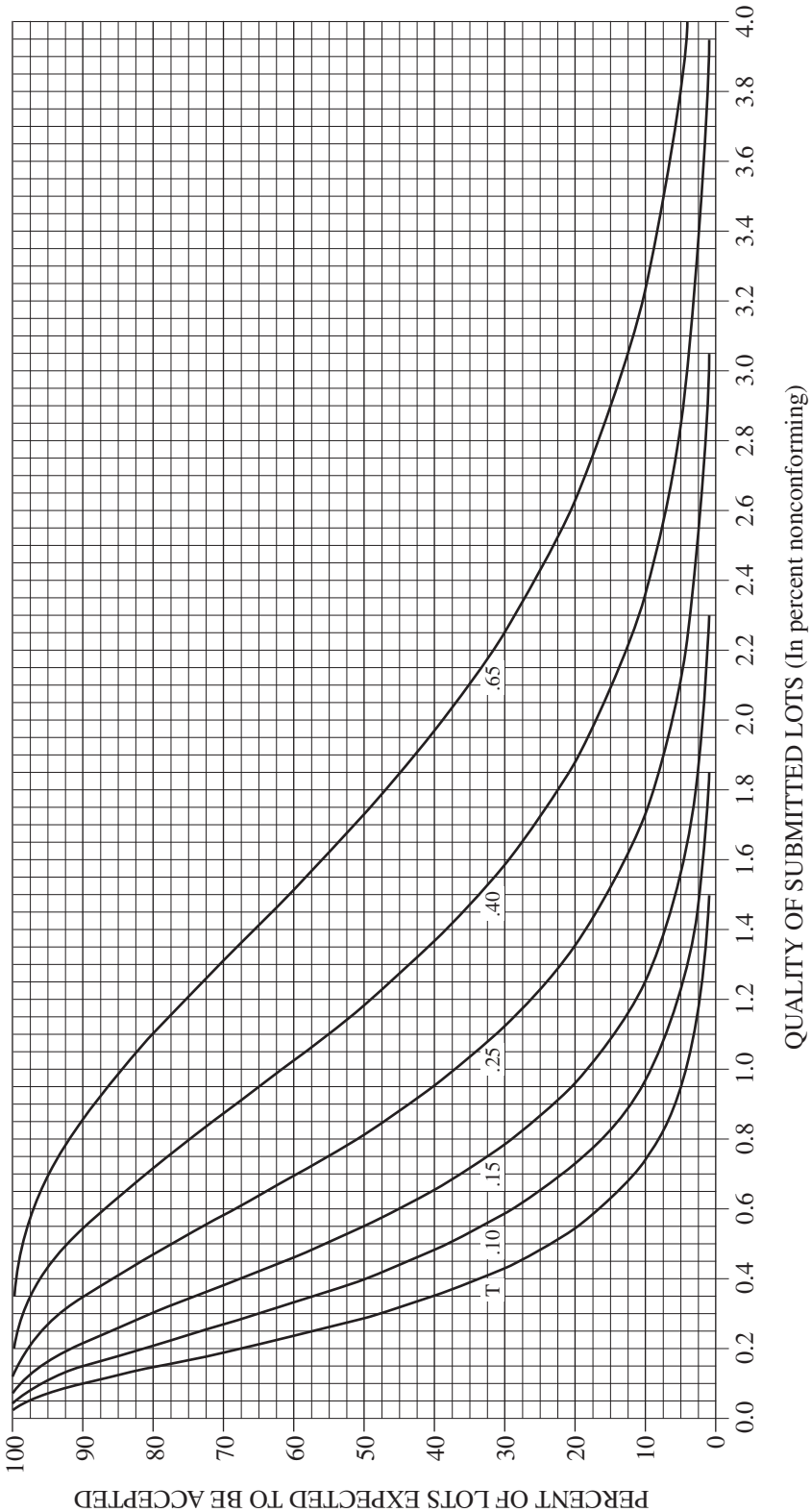
## Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method

### Sample Size Code Letter L

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. T denotes plan used exclusively on tightened inspection and provides symbol for identification of appropriate OC curve. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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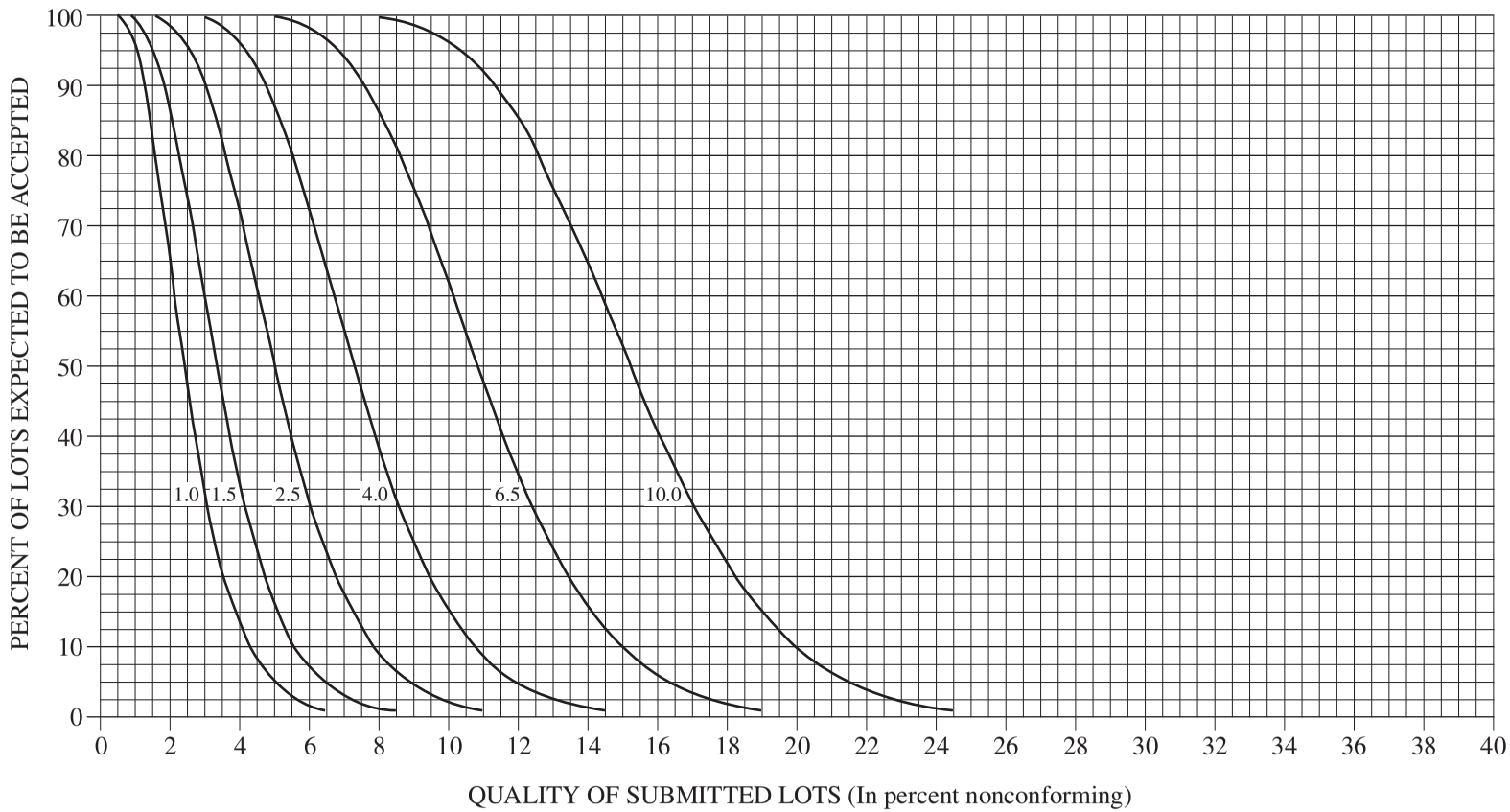
*Table A-3*

Operating Characteristic Curves for Sampling Plans Based on Standard Deviation Method
Sample Size Code Letter L (Continued)

(Curves for sampling plans based on range method and known variability are essentially equivalent)




NOTE: Figures on curves are acceptance quality limits (AQLs) for normal inspection. The values of the percent of lots expected to be accepted are valid only when measurements are selected at random from a normal distribution.



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