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Standard Practice for Use of Process Oriented AOQL and LTPD Sampling Plans¹

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INTRODUCTION

This standard is an abbreviated compilation of the sampling plans presented by H.F. Dodge and H.G. Romig in their classic development of sampling plans for use with the process associated with a continuing supply of products. The so called AOQL plans provide a means for disposition of product whether or not the process is in control as well as incentives for process improvement in terms of reduced sample size as the process average percent defective is lowered. In addition, so called LTPD plans are provided for use with individual lots of product, not necessarily associated with a process stream.

The sampling plans and parts of the text given here are taken from the Wiley Classics Library Edition of the Dodge-Romig tables (copyright 1998). Additional tables and detailed discussion of the plans, OC curves, and their derivation will be found in that text.² The theoretical development of the Dodge-Romig plans will be found in Volumes 8 and 20 of the Bell System Technical Journal^{3,4} and an amplification of the plans is given in *Acceptance Sampling in Quality Control*.⁵

1. Scope

1.1 This practice is primarily a statement of principals for the guidance of ASTM technical committees and others in the use of Average Outgoing Quality Limit, AOQL, and Lot Tolerance Percent Defective, LTPD, sampling plans for determining acceptable of lots of product.

2. Referenced Documents

2.1 ASTM Standards:

E 178 Practice for Dealing with Outlying Observations⁶

E 456 Terminology Relating to Quality and Statistics⁶

3. Terminology

3.1 *lot tolerance percent defective (LTPD)*—the percentage of defective units in a batch or lot for which, for purposes of acceptance sampling, the consumer wishes the probability of acceptance to be restricted to a specified low value, specifically 10 % for this practice. This is also referred to by the more general term *limiting quality* taken at 10 % consumer risk.

3.2 *average outgoing quality (AOQ)*—the average percent defective of outgoing product including all accepted lots or batches, after any defective units 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.

3.3 *average outgoing quality limit (AOQL)*—the maximum of the AOQs for all possible incoming percentages defective for the process, for a given acceptance sampling plan.

3.4 *lot quality protection*—a type of protection in which there is prescribed some chosen value of limiting percent defective in a lot (lot tolerance percent defective, (LTPD)) and also some chosen value for the probability (called the consumer's risk) of accepting a submitted lot that has a percent defective equal to the lot tolerance percent defective.

3.5 *average quality protection*—a type of protection in which there is prescribed some chosen value of average percent defective in the product after inspection (average outgoing quality limit (AOQL), that shall not be exceeded in the long run no matter what may be the level of percent defective in the product submitted to the inspector.

3.6 *consumer's risk*—the probability that a lot whose percentage defective is equal to the LTPD will be accepted by the plan.

4. Significance and Use

4.1 Two general types of tables (Note 1) are given, one based on the concept of lot tolerance, LTPD, and the other on AOQL. The broad conditions under which the different types have been found best adapted are indicated below.

4.1.1 For each of the types, tables are provided both for

¹ This practice is under the jurisdiction of ASTM Committee E-11 on Quality and Statistics and is the direct responsibility of Subcommittee E11.10 on Sampling and Data Analysis.

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² Available from John Wiley and Sons, Inc., 605 Third Ave., New York, NY 10158.

³ Dodge, H.F. and Romig, H.G., "A Method of Sampling Inspection," *The Bell System Technical Journal*, Vol 8, No. 10, 1924, pp. 613–631.

⁴ Dodge, H.F. and Romig, H.G., "Single Sampling and Double Sampling Inspection Tables," *The Bell System Technical Journal*, Vol 20, No. 1, 1941, pp. 1–61.

⁵ Schilling, E.G., "Acceptance Sampling in Quality Control," Marcel Dekker Inc., NY, 1982, pp. 372–399.

⁶ *Annual Book of ASTM Standards*, Vol 14.02.