

ANSI/ASQC S2-1995

AMERICAN NATIONAL STANDARD

Introduction to Attribute Sampling



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*Prepared by
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Foreword

This guide to the practice of sampling procedures for inspection by attributes is written to assist in the proper application of the standard ANSI/ASQC Z1.4. Much of what is included in this guide applies equally well to other standards for acceptance of lots by sampling procedures.

There are many other standards, mostly in foreign countries, based upon the same practice as that set forth in Z1.4. In fact, the system of selecting sample sizes and acceptance numbers based on the lot size and the choice of an AQL was based on the MIL-STD-105D tables. MIL-STD-105E uses the same tables and so does the International Organization for Standardization (ISO) in ISO 2859-1, as do most of the national standards.

The operating characteristics of Z1.4 are matched closely by the operating characteristics of ANSI/ASQC Z1.9, which establishes a procedure for the acceptance of lots on the basis of fraction nonconforming by variables. This is similar to the well-known MIL-STD-414, but 414 has not been updated to match the operating characteristics of 105D. It still matches the operating characteristics of MIL-STD-105A, which has somewhat different sampling plans.

ISO Technical Committee 69 on Application of Statistical Methods has a series of standards that are quite similar to those of the U.S. military standards and the ANSI/ASQC standards. These are written in British English, whereas American English is used here. Below is a list of equivalent standards which those dealing in the international arena may encounter. The operating characteristics are similar. Occasionally some seem quite different, as will be pointed out when we list the variable sampling plans for percent nonconforming. Some of these standards follow:

ANSI/ASQC Z1.4 = ISO 2859-1 = MIL-STD-105E, *Sampling Procedures and Tables for Inspection by Attributes.*

ANSI/ASQC Z1.9 = ISO 3951, *Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming*, which uses a graphical approach in applying the acceptance criteria. Both have operating characteristics essentially the same as the attribute plans above.

MIL-STD-414 DOES NOT MATCH ANY OF THE ABOVE!

ANSI/ASQC Q3 = ISO 2859-2, *Sampling Procedures and Tables for Inspection of Isolated Lots by Attributes.*

ANSI/ASQC S1 = ISO 2859-3, *An Attribute Skip-Lot Sampling Program.*

The symbol “=” is indicative of the standards being equivalent.

SECTION 1: GENERAL INTRODUCTION TO ACCEPTANCE SAMPLING

1.0 Introduction

This general introduction to sampling inspection is provided to describe the attribute sampling schemes set forth in ANSI/ASQC Z1.4, ANSI/ASQC Q3, ANSI/ASQC S3, and in the similar plans of the International Organization for Standardization (ISO) and in MIL-STD-105. This introduction treats the subject of sampling inspection by attributes in a general way, introduces the essential operating procedures, and the ways the schemes were designed to be used. To fully understand the concepts and their application it would be helpful for readers to have:

ANSI/ASQC Z1.4	<i>Sampling procedures for inspection by attributes— Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection</i>
ANSI/ASQC Q3	<i>Sampling procedures for inspection by attributes— Sampling plans indexed by limiting quality (LQ) for isolated lot inspection</i>
ANSI/ASQC S1	<i>Sampling procedures for inspection by attributes— Skip-lot sampling procedures</i>
ISO 8422	<i>Sequential sampling plans for inspection by attributes</i>
ISO TR8550	<i>Guide for the selection of an acceptance sampling system, scheme or plan for inspection of discrete items in lots.</i>

The individual Parts of the standards extend this introductory explanation to more specific uses of the procedures which are appropriate for the particular Part or Standard.

It is emphasized that ANSI/ASQC Z1.4 provides sampling schemes indexed by AQL. The quality measure used can be percent nonconforming or the number of nonconformities per hundred items. ANSI/ASQC Z1.4 was developed for the inspection of a **continuing series of lots** all originating from the same source, since in this situation adequate protection is possible by use of the switching rules, i.e., switching from normal to tight-

ened inspection, should a certain (limiting) number of unacceptable batches be found in a short series of successive batches. If switching is indicated, it is wise to question the immediately preceding batches if they are available.

ANSI/ASQC Q3 provides sampling plans arranged for use when individual or isolated lots are to be sampled. These sampling plans are in many instances identical with those in ANSI/ASQC Z1.4. All the tables of sampling plans in ANSI/ASQC Q3 include information regarding the quality level required to assure a high probability of lot acceptance. It is recommended that ANSI/ASQC Q3 be used for individual or isolated lots rather than ANSI/ASQC Z1.4. This document contains quality levels obtained by use of the hypergeometric procedure.

ANSI/ASQC S1 provides skip-lot procedures for use when the process quality is **markedly** superior to the AQL for a defined long period of delivery or observation. When the quality level is in this state of excellence, it is sometimes more economical to use ANSI/ASQC S1 than to use the reduced sampling procedure of ANSI/ASQC Z1.4. ANSI/ASQC Z1.4 and ANSI/ASQC S1 are applicable to a continuing series of lots from a single source.

ISO 8422 provides a method of establishing sequential sampling plans of essentially equivalent discriminatory power to individual plans of ANSI/ASQC Z1.4 and ANSI/ASQC Q3.

A complementary system of sampling plans by variables also indexed by AQL, is provided by ANSI/ASQC Z1.9, *Sampling procedure and tables for inspection by variables for percent nonconforming*, and by ISO 8423, *Sequential sampling plans for inspection by variables for percent nonconforming (known standard deviation)*.

In many situations producers have established process controls which customers have accepted as proof of quality and have therefore suspended sampling inspection on a regular basis.

1.1 Scope

Section 1 gives general information on methods of acceptance sampling inspection with particular reference to the sampling procedures and tables for inspection by