TECHNICAL REPORT

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Guide for the selection of an acceptance sampling system, scheme or plan for inspection of discrete items in lots

Guide pour la sélection d'un système d'échantillonnage pour acceptation, d'un schéma ou d'un plan pour le contrôle d'individus discrets dans un lot

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Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 8550, which is a Technical Report of type 3, was prepared by Technical Committee ISO/TC 69, *Applications of statistical methods*, Sub-Committee SC 5, *Acceptance sampling*.

The primary purpose of this Technical Report is to give guidance in the selection of an acceptance sampling system, scheme or plan. It does this principally in the context of existing or draft ISO Standards. It reviews the available systems and shows ways in which they can be compared in order to assess their suitability for an intended application. The guide also indicates how prior knowledge of the manufacturing or service delivery process and quality performance could influence the choice of the sampling system, scheme or plan, and likewise how the particular needs of the customer affect the selection. Some specific circumstances encountered in practice are described and the method of choosing a plan is explained. Some check lists or pointers and tables are provided to assist users in selecting an appropriate system, scheme or plan for their purpose. Two charts are included to illustrate the procedures followed in the selection process.

Introduction

For the inspection of discrete items submitted in lots this International Technical Report gives guidance in the selection of an appropriate acceptance sampling scheme from those described in the relevant ISO standards.

There are many situations where products (materials, parts, components, assemblies and systems) are transferred from one organization to another, where the organizations may be different companies or parts of a single company or even different shops within a plant. In these situations both the supplier and the customer may use acceptance sampling procedures to satisfy themselves that the product is of acceptable quality. The supplier will be seeking to maintain a reputation for good quality and to reduce the likelihood of claims under warranty, but without incurring unnecessary production and supply costs. On the other hand, the customer will require adequate evidence, at minimum cost to himself, that the product he receives conforms to specification. Compared with, say, 100% inspection, suitable sampling methods will often be beneficial in achieving these aims. Sometimes acceptance sampling methods may be the only practical procedure, especially when the tests for conformance are destructive.

Several types of sampling systems, schemes and plans are available for these purposes. They are presented in a number of ISO Standards which explain how they are to be used. However, it is often difficult to decide on the most appropriate procedure for use in a particular situation. The purpose of this Technical Report is to assist in that decision.

The choice of which sampling system, scheme or plan to use depends on a number of conditions and the circumstances prevailing. In any supply situation the first essential is that the supplier and the customer understand, and have agreed, the requirements and the basis for release and acceptance of the product, including any acceptance sampling methods to be used.

The parties should agree on the following:

(a) the specification to which the discrete items of product are to conform; this is necessary because in all dealings between the parties there has to be agreement on what constitutes a conforming item and what constitutes a nonconforming item;

(b) whether the acceptance of the product is to be determined by the acceptance of individual items or collectively by the acceptance of inspection lots of items. Acceptance of individual items precludes sampling.

When the acceptance is to be on a lot basis, the agreement between supplier and recipient needs to include not only the criteria for item conformance but also the criteria for lot acceptance, the criteria for non-acceptance of the lot and the acceptance sampling system, scheme or plan to be used. The latter should be based on risk factors that are mutually acceptable between producer and customer.

Having agreed on the acceptance sampling system, scheme or plan to be used, the supplier knows, at various quality levels, the probability that his supply lots will be accepted. Likewise the customer understands the protection that the sampling system, scheme or plan gives him to prevent acceptance of poor quality product.

Lots that are not acceptable cause difficulties for both supplier and customer. The supplier incurs additional costs in rework, scrap, increased inspection, damage to reputation and he may suffer loss of sales. Delays in delivery and reinspection costs are a burden to the customer. For these reasons it is usually considered essential for the supplier to provide lots that have a very high probability of being accepted - 95% or more. The supplier has to ensure that quality control of the production or delivery process provides lots of a quality sufficient to meet this objective. A basic principle of some acceptance sampling inspection schemes is to promote the *production* of lots of acceptable quality. The primary purpose in these schemes is not to discriminate between acceptable and non-acceptable lots, i.e. to sort, but to keep production under control to yield an acceptable process average quality. Although all acceptance sampling plans are discriminatory to some degree, the process average quality (expressed in terms of percent nonconforming or number of nonconformities) should not be greater than half the acceptable quality level in order to ensure a very high probability of acceptance.

Guide for the selection of an acceptance sampling system, scheme or plan for inspection of discrete items in lots

1 Scope

The primary purpose of this Technical Report is to give guidance in the selection of an acceptance sampling system, scheme or plan. It does this principally in the context of existing ISO standards.

The guidance in this Technical Report is confined to acceptance sampling of products that are supplied in lots and that can be classified as consisting of discrete items (discrete articles of product). Each item in a lot can be identified and segregated from the other items in the lot and has an equal chance of being included in the sample. Each item of product is countable and has specific characteristics that are measurable or classifiable as being conforming or nonconforming (to a given specification).

The ISO Standards on acceptance sampling, and hence this Technical Report, are applicable to a wide variety of inspection situations. These include, but are not limited to, the following:

(a) end items, such as complete products or sub-assemblies;

(b) components and raw materials;

(c) services;

(d) materials in process;

(e) supplies in storage;

(f) maintenance operations;

(g) data or records;

(h) administration procedures.

Although the Technical Report is written principally in terms of manufacture and production, this should be interpreted liberally as it is applicable to the selection of sampling systems, schemes and plans for all types of product and processes as defined in ISO 8402.

2 References

- ISO 2854:1976 *Statistical interpretation of data - Techniques of estimation and tests relating to means and variances*
- ISO 2859-0[1] *Sampling procedures for inspection by attributes* Part 0: *Introduction to the ISO 2859 attribute sampling system*
- ISO 2859-1:1989 *Sampling procedures for inspection by attributes* Part 1: *Sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection*
- ISO 2859-2:1985 *Sampling procedures for inspection by attributes* Part 2: *Sampling plans indexed by limiting quality (LQ) for isolated lot inspection*
- ISO 2859-3:1991 *Sampling procedures for inspection by attributes* Part 3: *Skip-lot sampling procedures*
- ISO 3534-1:1993 *Statistics - Vocabulary and symbols* Part 1: *Probability and general statistical terms*
- ISO 3534-2:1993 *Statistics - Vocabulary and symbols* Part 2: *Statistical quality control*
- ISO 3951:1989 *Sampling procedures and charts for inspection by variables for percent nonconforming*
- ISO 8402:1994[2] *Quality management and quality assurance - Vocabulary*
- ISO 8422:1991 *Sequential sampling plans for inspection by attributes*
- ISO 8423:1991 *Sequential sampling plans for inspection by variables for percent nonconforming (known standard deviation)*

[1] In preparation
[2] Publication imminent