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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16269-8 was prepared by Technical Committee ISO/TC 69, *Application of statistical methods*.

ISO 16269 consists of the following parts, under the general title *Statistical interpretation of data*:

— *Part 6: Determination of statistical tolerance intervals*

— *Part 7: Median — Estimation and confidence intervals*

— *Part 8: Determination of prediction intervals*

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Introduction

Prediction intervals are of value wherever it is desired or required to predict the results of a future sample of a given number of discrete items from the results of an earlier sample of items produced under identical conditions. They are of particular use to engineers who need to be able to set limits on the performance of a relatively small number of manufactured items. This is of increasing importance with the recent shift towards small-scale production in some industries.

Despite the first review article on prediction intervals and their applications being published as long ago as 1973, there is still a surprising lack of awareness of their value, perhaps due in part to the inaccessibility of the research work for the potential user, and also partly due to confusion with confidence intervals and statistical tolerance intervals. The purpose of this part of ISO 16269 is therefore twofold:

— to clarify the differences between prediction intervals, confidence intervals and statistical tolerance intervals;

— to provide procedures for some of the more useful types of prediction interval, supported by extensive, newly-computed tables.

For information on prediction intervals that are outside the scope of this part of ISO 16269, the reader is referred to the Bibliography.

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Statistical interpretation of data —

Part 8:
Determination of prediction intervals

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1 Scope

This part of ISO 16269 specifies methods of determining prediction intervals for a single continuously distributed variable. These are ranges of values of the variable, derived from a random sample of size n, for which a prediction relating to a further randomly selected sample of size m from the same population may be made with a specified confidence.

Three different types of population are considered, namely:

a) normally distributed with unknown standard deviation;

b) normally distributed with known standard deviation;

c) continuous but of unknown form.

For each of these three types of population, two methods are presented, one for one-sided prediction intervals and one for symmetric two-sided prediction intervals. In all cases, there is a choice from among six confidence levels.

The methods presented for cases a) and b) may also be used for non-normally distributed populations that can be transformed to normality.

For cases a) and b) the tables presented in this part of ISO 16269 are restricted to prediction intervals containing *all* the further m sampled values of the variable. For case c) the tables relate to prediction intervals that contain at least $m - r$ of the next m values, where r takes values from 0 to 10 or 0 to $m - 1$, whichever range is smaller.

For normally distributed populations a procedure is also provided for calculating prediction intervals for the mean of m further observations.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3534-1, *Statistics — Vocabulary and symbols — Part 1: Probability and general statistical terms*

ISO 3534-2, *Statistics — Vocabulary and symbols — Part 2: Statistical quality control*

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