International Standard

ISO 2602

Statistical interpretation of test results — Estimation of the mean — Confidence interval

Interprétation statistique de résultats d'essais — Estimation de la moyenne — Intervalle de confiance

Second edition — 1980-02-15

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2602 was developed by Technical Committee ISO/TC 69, *Applications of statistical methods*.

This second edition was submitted directly to the ISO Council, in accordance with clause 5.10.1 of part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 2602-1973), which has been approved by the member bodies of the following countries :

Australia	India	Portugal
Austria	Ireland	Romania
Belgium	Israel	South Africa, Rep. of
Czechoslovakia	Italy	Sweden
Egypt, Arab Rep. of	Japan	Switzerland
France	Netherlands	Thailand
Germany, F.R.	New Zealand	United Kingdom
Hungary	Poland	USSR

No member body had expressed disapproval of the document.

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0 Introduction

The scope of this International Standard is limited to a special question. It concerns only the estimation of the mean of a normal population on the basis of a series of tests applied to a random sample of individuals drawn from this population, and deals only with the case where the variance of the population is unknown. It is not concerned with the calculation of an interval containing, with a fixed probability, at least a given fraction of the population (statistical tolerance limits).

It is recalled that ISO 2854 relates to the following collection of problems (including the problem treated in this International Standard) :

— estimation of a mean and of the difference between two means (the variances being either known or unknown);

— comparison of a mean with a given value and of two means with one another (the variances being either known or unknown, but equal);

— estimation of a variance and of the ratio of two variances;

— comparison of a variance with a given value and of two variances with one another.

The test methods generally provide for several determinations which are carried out :

— on the same item (where the test is not destructive);

— on distinct portions of a very homogeneous product (a liquid, for example);

— on distinct items sampled from an aggregate with a certain amount of variability.

In the first two cases, the deviations between the results obtained depend only upon the repeatability of the method. In the third case, they depend also on the variability of the product itself.

The statistical treatment of the results allows the calculation of an interval which contains, with a given probability, the mean of the population of results that would be obtained from a very large number of determinations, carried out under the same conditions. In the case of items with a variability, this International Standard assumes that the individuals on which the determinations are carried out constitute a random sample from the original population and may be considered as independent.

The interval so calculated is called the confidence interval for the mean. Associated with it is a confidence level (sometimes termed a confidence coefficient), which is the probability, usually expressed as a percentage, that the interval does contain the mean of the population. Only the 95 % and 99 % levels are provided for in this International Standard.

1 Scope

This International Standard specifies the statistical treatment of test results needed to calculate a confidence interval for the mean of a population.

2 Field of application

The test results are expressed by measurements of a continuous character. This International Standard does not cover tests of a qualitative character (for example presence or absence of a property, number of defectives, etc.).

The probability distribution taken as a mathematical model for the total population is a normal distribution for which parameters, mean m and standard deviation σ, are unknown.

The normality assumption is very widely satisfied : the distribution of the results obtained under test conditions is generally a normal or nearly normal distribution.

It may, however, be useful to check the validity of the assumption of normality by means of appropriate methods[1].

The calculations may be simplified by a change of the origin or the unit of the test results but it is dangerous to round off these results.

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1) This subject is in preparation.