

Control charts — General guide and introduction

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Management Systems Sector Board to Technical Committee QMS/14, upon which the following bodies were represented:

- Clay Pipe Development Association Limited
- Gauge and Tool Makers' Association
- Institute of Quality Assurance
- Mercury Communications Limited
- Ministry of Defence
- Peratec Limited
- Royal Statistical Society
- Society of Motor Manufacturers and Traders Limited

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National foreword

This British Standard has been prepared under the direction of the Management Systems Sector Board. It is identical with ISO 7870:1993 *Control charts — General guide and introduction*, published by the International Organization for Standardization (ISO).

During the preparation of ISO 7870 the United Kingdom contributed numerous comments to assist in clarification and correction of the text. The vast majority of these comments were accepted and are reflected in the standard. However, the national committee wishes to bring the following two points to the attention of the users of this standard.

First, ISO 7870 uses the term *control limit* in the sense of a control line drawn onto a control chart. In contrast, the national committee differentiates between the terms *control limit*, a calculated numerical value, and *control line* which is the line drawn on the control chart, graphically representing the control limit. This distinction will also be made in other related British Standards.

Secondly, the last paragraph of clause 5 incorrectly suggests (in two places) that the parenthesized term *standard error* is interchangeable with the term *standard deviation*. The United Kingdom does not approve of this wording and commented accordingly during the drafting stages. However, the comment was not accepted by the ISO drafting committee.

Cross-references

International standard	Corresponding British Standard
	BS ISO 3534 <i>Statistics. Vocabulary and symbols</i>
ISO 3534-1:1993	Part 1:1993 <i>Probability and general statistical terms</i> (Identical)
ISO 3534-2:1993	Part 2:1993 <i>Statistical quality control</i> (Identical)
ISO 7966:1993	BS 7783:1994 <i>Acceptance control charts</i> (Identical)
ISO 8258:1993	BS 7785:1994 <i>Shewhart control charts</i> (Identical)

The Technical Committee has reviewed the provisions of ISO 7873, to which normative reference is made in the text, and has decided that they are acceptable for use in conjunction with this British Standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This International Standard presents key elements and philosophy of the control chart approach, and identifies a wide variety of control charts, including those related to the Shewhart control chart and those with process acceptance or on-line predictive emphasis.

It presents an overview of the basic principles and concepts and illustrates the relationship among various control chart approaches to aid in the selection of the most appropriate standard for given circumstances.

It does not specify statistical control methods using control charts. These methods will be specified in ISO 7873 and ISO 7966, and in other future International Standards.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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 7873:1993, *Control charts for arithmetic average with warning limits*.

ISO 7966:1993, *Acceptance control charts*.

ISO 8258:1991, *Shewhart control charts*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 3534-1 and ISO 3534-2 apply.

4 General

Control charts are a fundamental tool of statistical quality control. They are a method for comparing information from samples representing the current state of a process against limits established after consideration of inherent process variability. Their primary use is to provide a means of evaluating whether a manufacturing service or administrative process is or is not in a “state of statistical control”. While originally developed for industrial production and development applications, control chart methods are now widely used in a very broad range of service and support operations as well. In essence, control charts are a management tool to assist in determining when a process is stable or has changed and they are useful at management levels as well as for the operator to control at the workplace.

Inherent variability is present in all operations due to numerous, but usually minor, chance causes, so that the observed results from a stable process are not constant, and statistically valid limits are required to minimize erroneous decisions leading to over-or under-control.

A process is considered to be in a “state of statistical control” if there are no systematic shifts entering the process. In essence, when a process is “in control” it is possible to predict reliably the behaviour of that process, whereas when non-chance (or special) causes enter the system, the process is subject to the results of these causes and the outcome cannot be predicted without information about their presence and effect. A process that is found to be not in a “state of statistical control” requires intervention to bring it into such a state. For certain economic or natural phenomena there may be no known way to intervene and the control chart simply serves to identify a lack of control.

Control charts provide a simple graphical method for evaluating whether or not the process has attained, or continues in, a “state of statistical control”. The determinations are made through comparison of the values or patterns of some statistical measure(s) for an ordered series of samples, or subgroups, with control limits. There is a variety of specific control charts, each designed for the types of decision to be made, the nature of the data, and the type of statistic used. The word “statistic” emphasizes that measurements are subject to inherent errors from such sources as obtaining the sample, or from the measurement process itself, and therefore represent a sample with inherent sampling variability.