



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 17989.9-2022

**Statistical method of quality control in production process -
Control charts - Part 9: Control charts for stationary processes**

Issued on: March 9, 2022

Implemented on: October 1, 2022

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

Table of Contents

foreword

Introduction

1 Scope

2 Normative references

3 Terms and Definitions, Symbols and Abbreviations

3.1 Terms and Definitions

3.2 Symbols and Abbreviations

foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules of Standardization Documents" drafted.

This document is part 9 of GB/T 17989. GB/T 17989 has released the following parts.

- Control Charts Part 1. General Guidelines;
- Control Charts Part 2. General Control Charts;
- Control Charts Part 3. Acceptance Control Charts;
- Control Charts Part 4. Cumulative and Control Charts;
- Statistical method control charts for quality control in production processes - Part 5. Special control charts;
- Statistical method control chart for quality control of production process Part 6. Exponentially weighted moving average control chart;
- Statistical method control chart for quality control in production process Part 7. Multivariate control chart;
- Statistical method control chart for quality control in production process Part 8. Control method for short cycle and small batch;
- Statistical methods for quality control of production process control charts Part 9. Stationary process control charts.

This document is equivalent to ISO 7870-9:2020 "Control Charts - Part 9. Smooth Process Control Charts".

The following minimal editorial changes have been made to this document.

--- Change the standard name to "Production Process Quality Control Statistical Methods Control Chart Part 9.Smooth Process Control Chart".

Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents.

Introduction

Control charts are commonly used statistical tools in process control to monitor deviations in the process and keep the process stable. GB/T 17989 control

Figure series standards are divided into the following 9 parts.

--- Control Charts Part 1.General Guidelines. The purpose is to give the basic terms, principles and classification of control charts, and to select control charts guide.

--- Control charts Part 2.General control charts. The purpose is to establish guidelines for process control using conventional control charts.

--- Control charts Part 3.Acceptance control charts. The purpose is to establish guidelines for the use of acceptance control charts for process control, and to specify

General procedures for determining subgroup sample sizes, action limits, and decision criteria are described.

--- Control Charts Part 4.Cumulative and Control Charts. The purpose is to establish the application of cumulative and techniques for process monitoring, control and review

Statistical methods for sex analysis.

--- Statistical methods for quality control of production process control charts Part 5.Special control charts. The purpose is to establish the understanding and application of

A guide to statistical process control with special control charts.

--- Production process quality control statistical methods control charts Part 6.Exponentially weighted moving average control charts. The purpose is to establish

A guide to understanding and applying exponentially weighted moving average (EWMA) charts for statistical process control.

--- Statistical methods for quality control of production process control charts Part 7.Multivariate control charts. The purpose is to establish the construction and application of multiple

A guide to statistical process control with meta-control charts and establishes routine

methods for using and understanding multi-variable control charts for measurement data.

--- Statistical methods of production process quality control control chart Part 8. Control methods for short cycle and small batches. The purpose is to establish

When the subgroup size is 1, the conventional metrology control chart is used to detect the method of short cycle and small batch production process.

--- Statistical methods for quality control of production process control charts Part 9. Stationary process control charts. The purpose is to establish the construction and application of

A guide to controlling stationary processes with control charts.

In industrial production, statistical process control (SPC) technology is widely used for process control and quality improvement. Various statistical-based controls

Graphs are proposed to monitor the mean and divergence of the process. The traditional statistical process control theory is based on the "statistical independence of process data".

based on this assumption. However, process data are not always statistically independent of each other. In continuous production industries such as chemicals, most descriptions

There is an autocorrelation in the process data for the described quality characteristics. In general, autocorrelation can be caused by measurement systems, dynamic processes, or both

of. In most cases, the data will drift. In biology, random biological changes can have lasting effects, so that several consecutive

Subsequent measurements are affected by the same random phenomenon. For example, the random burst secretion of certain substances that affect blood pressure. in data collection

In the process, when the sampling interval is short, the autocorrelation of the data, especially the positive autocorrelation, becomes a problem to be paid attention to. In this situation,

Traditional statistical process control methods are no longer suitable for monitoring, controlling and improving process quality.

Depending on whether it is stationary, autocorrelation processes can be divided into the following two categories.

1) Stationary process-a direct extension of an independent and identically distributed (iid) sequence. If an autocorrelation process is in a state of "statistical equilibrium"

state is stable. This shows that the underlying performance of the process does not change over time. In particular, the mean and square of a stationary process

The difference is constant.

2) Non-stationary process

See Appendix A for details on stochastic processes and time series.

In order to monitor the autocorrelation data, a new statistical process control method is proposed, which is mainly divided into two types. the first method is to first use the data to simulate

A time series model or other mathematical model is combined, and the residual control chart of the process is used to monitor it. Another more direct method is

Improve existing control charts, for example, by adjusting control limits based on the autocorrelation of the process.

The purpose of this document is to outline several main control charts for monitoring the mean and variance of stationary processes.

Production process quality control statistical method control chart

Part 9.Stationary Process Control Charts

1 Scope

This document gives guidelines for constructing and applying control charts to control stationary processes.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations

documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to

this document.

GB/T 3358.2 Statistical vocabulary and symbols - Part 2.Applied statistics (GB/T 3358.2-2009, ISO 3534-2.2006,

IDT)

3.1 Terms and Definitions

The terms and definitions defined in GB/T 3358.2 and the following apply to this document.

3.1.1

autocovariance autocovariance