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

GB/T 17989.6-2022

**Statistical method of quality control in production process -
Control charts - Part 6: EWMA control charts**

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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 6 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 modified to adopt ISO 7870-6:2016 "Control Charts - Part 6. Exponentially Weighted Moving Average Control Charts".

This document has the following structural adjustments compared to ISO 7870-6:2016.

--- In Chapter 1, the entire paragraph "recommended to use conventional control charts in the following situations" is put into Note 1, which is more in line with the narrative logic;

--- Change Chapter 3 "Symbols and Abbreviations" to "Terms, Symbols and Abbreviations", add 3.1 Terms and Definitions, and give the terms used

In the description, "Symbols and Abbreviations" are divided into "3.2 Symbols" and "3.3 Abbreviations".

The technical differences between this document and ISO 7870-6:2016 and their reasons are as follows.

--- Modify the symbol "N" in this document to "n", and its interpretation "the number of individuals in the sample (sample size)" to "subgroup size", and

Other parts of this series of standards remain consistent;

--- Modify the "true value of the standard deviation of the binomial distribution with $P=p_0$ " in the explanation of the symbol " σ_0 " in Chapter 3 to "the binomial distribution with probability p_0 "

The true value of the distribution standard deviation", the explanation is more clear;

--- Modify "When $\lambda=1$, the EWMA control chart is the mean value control chart" in Chapter 4 4.1 to "When $\lambda=1$, EWMA

The control chart is the single-value $\bar{X}$ control chart", the original error is corrected.

The following editorial changes have been made to this document.

--- Change the standard name to "Production Process Quality Control Statistical Methods Control Chart Part 6.Exponential Weighted Moving Average Control picture";

--- Change the English of "centerline" in 3.2.2 to "centerline";

---Convert the formula (8) of 4.3 in Chapter 4 " $UCL=\mu_0-Lz$
($2-\lambda$)

" is modified to " $UCL=\mu_0 Lz$

($2-\lambda$)

";

--- Modify the header "EWMA value" of 4.4 Table 1 in Chapter 4 to "EWMA z_i ";

--- Amend "point 28" in 4.5 of Chapter 4 to "points 29 and 30";

- Modify "14.5 samples required" in 5.2 of Chapter 5 to "14.9 samples required";
- Modify "EWMA control chart with $\pm 3\sigma$ " in 5.2 of Chapter 5 to "EWMA control chart with $\pm 3\sigma/n$ control"

limit";

- Deleted the note to 5.3.2 in Chapter 5;

- The formula (21) in Chapter 5 " $\Delta_1 = \min$

$U/4 - \mu_0$

σ_0

$, \mu_0 - L/4$

σ_0 " is modified to $\Delta_1 = \min U - \mu_0 \sigma_0, \mu_0 - L \sigma_0$;

- Modify " $\Delta n = 2$ " in 5.3.4 of Chapter 5 to " $\Delta_1 n = 2$ ";

- Modify the formula (A.2) of Appendix A " $L_\mu = TL - 3\sigma_0 = 99.5 \times 0.1 = 99.8$ " to " $L_\mu = TL - 3\sigma_0 = 99.5$

$3 \times 0.1 = 99.8$ ";

- Modify "Use Table 3" in C.2 of Appendix C to "Use Table 4".

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.

Conventional control chart is the most widely used statistical control method in process control, but it is relatively slow to monitor the small deviation of the process.

Exponentially weighted moving average control charts can quickly detect small and medium excursions in the process in a timely manner.

Conventional control charts are easy to use and can quickly detect large process excursions, however they are not effective in monitoring small, medium and large process excursions.

Amplitude offset. In many cases, process changes occur slowly and gradually (especially in the case of continuous production). In order to prevent serious deviation of the process

This change needs to be detected early. There are two ways to improve the effectiveness of routine control charts for monitoring small and moderate excursions.