
Control charts —

**Part 4:
Cumulative sum charts**

Cartes de contrôle —

Partie 4: Cartes de contrôle à somme cumulée





COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword.....	v
Introduction.....	vi
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions, abbreviated terms and symbols.....	1
3.1 Terms and definitions.....	1
3.2 Abbreviated terms.....	2
3.3 Symbols.....	2
4 Principal features of cumulative sum (CUSUM) charts.....	3
5 Basic steps in the construction of CUSUM charts — Graphical representation.....	4
6 Example of a CUSUM plot — Motor voltages.....	5
6.1 Process.....	5
6.2 Simple plot of results.....	5
6.3 Standard control chart for individual results.....	6
6.4 CUSUM chart construction.....	7
7 Fundamentals of making CUSUM-based decisions.....	8
7.1 Need for decision rules.....	8
7.2 Basis for making decisions.....	8
7.3 Measuring the effectiveness of a decision rule.....	9
7.3.1 Basic concepts.....	9
7.3.2 Example of calculation of ARL.....	10
8 Types of CUSUM decision schemes.....	10
8.1 V-mask.....	10
8.1.1 Configuration and dimensions.....	10
8.1.2 Application of the V-mask.....	11
8.1.3 Average run lengths.....	14
8.1.4 General comments on average run lengths.....	15
8.2 Fast-initial response (FIR) CUSUM.....	16
8.3 Tabular CUSUM.....	16
8.3.1 Rationale.....	16
8.3.2 Deployment.....	17
9 CUSUM methods for process and quality control.....	19
9.1 Nature of the changes to be detected.....	19
9.1.1 Size of the changes to be detected.....	19
9.1.2 'Step' changes.....	19
9.1.3 Drifting.....	19
9.1.4 Cyclic.....	19
9.1.5 Hunting.....	19
9.2 Selecting target values.....	19
9.2.1 General.....	19
9.2.2 Standard (given) value as target.....	20
9.2.3 Performance-based target.....	20
9.3 CUSUM schemes for monitoring location.....	20
9.3.1 Standard schemes.....	20
9.3.2 Standard schemes — Limitations.....	27
9.3.3 'Tailored' CUSUM schemes.....	27
9.4 CUSUM schemes for monitoring variation.....	28
9.4.1 General.....	28
9.4.2 CUSUM schemes for subgroup ranges.....	29
9.4.3 CUSUM schemes for subgroup standard deviations.....	32
9.5 Special situations.....	36