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

GB/T 45133-2025

**Gas analysis - The determination of the composition of gas
mixtures - Comparison methods based on one-and two-point
calibration**

气体分析 混合气体组成的测定 基于单点和两点校准的比较法

(English Translation)

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Table of Contents

Preface	
Introduction	
1 Scope	
2 Normative references	
3 Terms and Definitions	
4 Symbols	
5 Abbreviations	
6 Principle	
6.1 General requirements	
6.2 Calibration method	
7 Main procedures	
7.1 Preparation before calibration	
7.2 Operation Process	
7.3 Calibration and measurement methods	
8 Performance evaluation of analytical system	
8.1 General	
8.2 Sources and alternative methods of performance evaluation data	
9 Quality Assurance Measures	
9.1 Confirmation of assumptions	
9.2 Analytical System Drift or Stability Control	
10 Results Report	
10.1 Certificate	
10.2 Analysis Report	
Appendix A (Informative) Technical differences between this document and ISO 12963:2017 and their causes	
Appendix B (Normative) System stability checks required when using the exact match method and the two-point method	

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 for standardization documents" Drafting.

This document is modified to adopt ISO 12963:2017 "Gas analysis for the determination of the composition of mixed gases based on single-point and two-point calibration" "Comparative Law".

This document has the following structural adjustments compared to ISO 12963:2017.

- Adjust paragraph 2 in Chapter 1 to paragraph 1;
- Appendix B adds clauses B.2.1, B.2.2, B.3.1 and B.3.2.

This document has many technical differences compared to ISO 12963:2017.

A single line (|) is used to indicate these technical differences. A list of these technical differences and their reasons is given in Appendix A.

The following editorial changes were made to this document.

- In order to coordinate with the existing standards, the name of the standard is changed to "Gas Analysis Determination of Mixed Gas Composition Based on Single-point and Two-point Calibration the comparative law of
- Incorporated the amendments to ISO 12963:2017/Amd.1.2020, the outer margins of the clauses involved are indicated by vertical Double lines (||) are marked;
- "calibration" is uniformly changed to "calibration";
- "SPB" in 8.1 is changed to "TPB";
- Added footnotes to Chapter 10;
- In this document, "measuring system" is changed to "analytical system";
- The uncertainty U in Appendix E is changed to standard uncertainty u;
- In Appendix E, "13510" is changed to "13510.0", and "4.70" is changed to "4.7";
- In Appendix E, "Formula (13)" is changed to "Formula (12)";
- Add "The uncertainty of the average value of the response value calculated by formula (C.1) and the average value of the response value calculated by formula (C.2)" in Appendix E Spend".

Introduction

The component content of the calibration gas mixture is usually determined by the comparison method. The comparison method based on multi-point calibration is applicable to all calibration gas mixtures.

However, due to the time-consuming, material-consuming and cumbersome operation of multi-point calibration, in many cases, single-point and two-point calibration are used to determine the value of the gas.

The comparison method is used as an alternative method and has been widely used in industrial gases and related fields.

Comparison of single-point and two-point calibration methods can usually provide a balance between the cost, effort and accuracy of determining the content of mixed gas components.

A reasonable balance is achieved; however, one-point and two-point calibrations need to be validated to ensure proper use.

This document provides the applicable conditions, limitations, evaluation of measurement uncertainty, and calculation methods for the comparison method based on single-point and two-point calibration.

and ways of expression.

Gas analysis Determination of the composition of mixed gases Comparison method based on one-point and two-point calibration

1 Scope

This document specifies the requirements and acceptable limits for different calibration methods when using a minimum number of calibration gas mixtures.

condition.

The methods described in this document are suitable for the following uses.

- Calibrate the instrument using one or two calibration gas mixtures;
- Determine the composition of gas samples;
- Evaluate the gas sample set according to the uncertainty of the composition of the calibration gas mixture and the uncertainty component introduced by the measurement process the uncertainty caused.

The method described in this document uses the mole fraction of a substance to express the composition amount. Other forms of quantity (such as mass fraction, volume fraction or concentration) are not used.

degrees) also applies.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version

(including all amendments) applies to this document.

bration gas mixtures)

Note: GB/T 35860-2018 Contents of mixed gas certificate for gas analysis calibration (ISO 6141:2015, IDT) ISO 6143 Gas analysis - Comparison of mixed gas compositions for determination and calibration Note. GB/T 10628-2008 Gas analysis calibration gas mixture composition determination and verification comparison method (ISO 6143:2001, IDT) ISO 7504 Gas analysis-Vocabulary Note. GB/T 14850-2020 Gas analysis vocabulary (ISO 7504:2015, IDT) ISO/IEC Guide 98-3:2008 Measurement uncertainty Part 3: Guide to the expression of uncertainty in measurement (GUM:1995) [Uncertainty in measurement... 1995)]

Note: GB/T 27418-2017 Evaluation and expression of measurement uncertainty (ISO/IEC Guide 98-3:2008, MOD)

3 Terms and definitions

The following terms and definitions as defined in ISO 7504, ISO/IEC Guide 98-3:2008 and ISO/IEC Guide 99 apply to this document.

document.