

ICS 75.080
CCS E 30



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

GB/T 6683-1997

**Petroleum and related products - Precision of measurement
methods and results - Part 1: Determination of precision data in
relation to methods of test**

(English Translation)

Issued on: January 1, 1970

Implemented on: January 1, 1970

Issued by: State Administration for Market Regulation

Table of Contents

Foreword	
Introduction	
1 Scope	
2 Normative references	
3 Terms and definitions	
4 Inter-laboratory research planning stage to determine the precision of the test method	
4.1 General	
4.2 Preparation of draft test method	
4.3 Design preliminary trials involving at least two laboratories	
4.4 Inter-Design Lab Research	
4.5 Performing inter-laboratory research	
5 Statistical processing of research results between laboratories	
5.1 General Recommendation	
5.2 Pre-screening using generalized extreme mean deviation (GESD) technology	
5.3 Data transformation and outlier test	
5.4 Discard all data from a sample (from all laboratories)	
5.5 Estimate missing or discarded values	
5.6 Abandonment of Outlier Laboratory Test	
5.7 Confirmation of the selected transformation	
6 Calculation and expression of variance analysis and precision estimation	
6.1 General	
6.2 Analysis of variance	
6.3 Mean Square Expectation and Precision Estimate Calculation	
6.4 Expression of test method precision	
Appendix A (informative) Formula derivation for estimating the number of laboratories and samples required to reach at least 30 degrees of freedom	
Appendix B (Normative) Determination of the number of samples required	
Appendix C (Normative) Data and tables required for statistical processing and inspection	
Appendix D (Normative) GESD technology for simultaneous determination of multiple outliers in data	
Appendix E (Normative) Examples and statistical tables of results of inter-laboratory studies on bromine number	

Appendix F (Normative) Association Type and Corresponding Transformation
Appendix G (Normative) Weighted Linear Regression Analysis
Appendix H (Normative) Repeatability standard deviation and laboratory standard deviation are transformed in different ways
Appendix I (Informative) Summary of Symbols and Explanations
Reference

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" Drafting.

This document is the first part of GB/T 6683 "Measurement Methods and Precision of Results for Petroleum and Related Products". GB/T 6683 has the following sections were released.

---Part 1: Determination of the precision data of the test method.

This document replaces GB/T 6683-1997 "Precision Data Determination Method for Petroleum Products Test Methods", and is consistent with GB/T 6683-1997 in addition to structural adjustments and editorial changes, the main technical changes are as follows.

- a) Added and changed some terms and definitions (see Chapter 3, Chapter 3 of the 1997 edition);
- b) Preliminary test procedures have been added (see 4.3);
- c) Increased the parameter leverage ratio of the inspected samples (see 4.4);
- d) The method of determining the number of laboratories and the number of samples has been changed (see 4.4, 4.3 in the 1997 edition);
- e) The specific requirements for performing inter-laboratory research have been changed (see 4.5, 4.4 and 4.5 of the 1997 edition);
- f) Added flow chart 1 (see 5.1) showing the procedure of transformation and outlier detection;
- g) The technology "Generalized Extreme Average Deviation (GESD)" (see 5.2), which is used for the results of the pre-screening test, has been added;
- h) Added the requirements and examples of whether data transformation is required and whether the transformation is successful or not (see 5.3.1);
- i) A description of outliers has been added (see 5.3.2);

- j) Added the requirement to check whether the used transformation is valid after discarding the outlier data (see 5.6);
- k) Added the requirements, methods and examples of selected transformation confirmation (see 5.7);
- l) The expression including the expectation of the mean square of the estimated value has been changed (see 6.3.2, 6.2.2 of the 1997 edition);
- m) Added suggestions for optimizing the test method when the degree of freedom of reproducibility is less than 30 (see 6.3.3.2);
- n) The precision expression method has been changed (see 6.4, 6.3 of the 1997 edition);
- o) The instructions for determining the number of samples have been added as Appendix B;
- p) Changed Appendix C on data tables and inspections (see Appendix C, Appendix A of the 1997 edition);
- q) Added a description of GESD technology as Appendix D;
- r) The calculation of the critical value of the normal distribution has been added (see E.8 in Appendix E);
- s) Appendix F of the association type and transformation has been changed (see Appendix F, Appendix C of the 1997 edition);
- t) Added the description of weighted linear regression analysis as Appendix G;
- u) The method of using different transformations for repeatability and reproducibility has been added as Appendix H.

This document uses the redrafting method to modify and adopt ISO 4259-1:2017 "Petroleum and Related Products Measurement Methods and Results Precision No.

Part 1: Determination of the precision data of the test method".

Compared with ISO 4259-1:2017, this document has made the following structural adjustments.

- Adjusted the number and order of appendices;
- Move the calculation example content in Appendix D into 5.3~6.3;
- Move the content of F.3 into Appendix G;
- Move the content of F.4 into 5.3.1.

The main technical differences between this document and ISO 4259-1:2017 and the reasons are as follows.

---Regarding normative reference documents, this document has made adjustments with technical differences to adapt to my country's technical conditions and adjustments.

The situation is collectively reflected in Chapter 2 "Normative Reference Documents", and the specific adjustments are as follows.

- Replace ISO 5725-2:1994 (see 5.3.1) with GB/T 6379.2 which is equivalent to the international standard;
- Added reference to GB/T 8170 (see H.5.1).
- Increase the repeatability and reproducibility of using different transformation methods to meet the requirements of use.
- The terms 3.6 and 3.10 that are not used in the text in ISO 4259-1:2017 are deleted.
- Deleted ISO 4259-1:2017 6.5 on the scope of the test method to adapt to the situation in my country.
- Deleted ISO 4259-1:2017 6.6 on the test method report limit description, in order to adapt to my country's use.
- Deleted the description of the R/r ratio in Chapter 7 in ISO 4259-1:2017 to adapt to the situation in my country.
- The introduction of symbols in ISO 4259-1:2017 C.1 was deleted to meet the requirements of GB/T 1.1.
- Deleted the content about amendments in Appendix G of ISO 4259-1:2017.

The following editorial changes have been made to this document.

- Incorporated the amendments of ISO 4259-1:2017/Amd1.2019 and ISO 4259-1:2017/Amd2.2020, which are involved the terms of has been marked by a vertical double line (||) on the outer margin of the page;
- Changed Figure 1 in 5.3.1 to reflect the technical differences between this document and ISO 4259-1:2017;
- Changed the expression in 5.3.3 to conform to the Chinese expression habits;
- Changed the expression in 5.3.4 to conform to the Chinese expression habits;
- Changed the expression in 5.4 to conform to the Chinese expression habits;
- Change the symbol K in 6.3.2 (change to J) to avoid duplication with K in 5.3.1 formula (5);
- Deleted the formulas and chapters in Table I.1 to avoid duplication.