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

GB/T 31593.5-2026

Replacing GB/T 31593.5-2015

**Fire safety engineering - Part 5: Requirements governing
algebraic equations for fire plumes**

消防安全工程 第5部分：火羽流的计算要求

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 5 of GB/T 31593 "Fire Safety Engineering". GB/T 31593 has already published the following parts.

---Part 1: Evaluation, Validation, and Validation of the Computation Methods;

---Part 2: Required Data Types and Information;

---Part 3: Guidelines for Fire Risk Assessment;

---Part 4: Setting up fire scenarios and selecting fire settings;

---Part 5: Calculation Requirements for Firefeather Stream;

---Part 6: Calculation Requirements for the Flue Gas Layer;

---Part 7: Calculation Requirements for Ceiling Jet Flow;

---Part 8: Calculation Requirements for Open Airflow;

---Part 9: Guidelines for personnel evacuation assessment this document replaces GB/T 31593.5-2015 "Fire Safety Engineering Part 5: Calculation Requirements for Fire Plume", and is consistent with GB/T 31593.5-Compared to 2015, aside from structural adjustments and editorial changes, the main technical changes are as follows.

a) Some terms and definitions have been added (see Chapter 3);

b) The description of the physical phenomenon, the calculation process, the limitations of the calculation formula, the input parameters of the calculation formula, and the applicability of the calculation formula have been modified.

Scope (see Chapters 4-8, Chapters 4-8 in the 2015 edition);

c) Added calculation examples (see Chapter 9).

This document is modified to adopt ISO 24678-2:2022 "Fire safety engineering calculation

formula control requirements - Part 2: Fire plume".

This document has undergone several structural adjustments compared to ISO 24678-2:2022. Appendix A provides a comparison of this document with ISO 24678-2:2022.

A comparison table of changes in structural numbering.

The technical differences between this document and ISO 24678-2:2022, and the reasons therefor, are as follows.

---The normative reference GB/T 5907 (all parts) has replaced ISO 13943 (see Chapter 3) to cover fire protection terminology in my country.

Scope of definition;

---ISO 24678-1 (see 4.1, 5.1, 7.3) has been replaced by the normatively referenced GB/T 31593.1 and GB/T 31593.4 for convenience.

Standard user execution.

The following editorial changes have been made to this document.

---Adjust the additional information in the international standard terminology definitions to the definition notes;

---The content of Chapters 4 through 8 is equivalent to the content in ISO 24678-1.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the National Fire and Rescue Administration.

This document is under the jurisdiction of the National Fire Protection Standardization Technical Committee (SAC/TC113).

Introduction

The objective of fire safety engineering is to use relevant calculation methods to predict the occurrence, development trend, and consequences of fires, and to assess fire safety measures.

The study aims to determine whether the measures can effectively mitigate the harm of fire to people, buildings, and the environment, providing a technical basis for achieving an acceptable level of fire safety.

The reliability of the algorithm needs to be evaluated, verified, and confirmed.

To verify whether the selected calculation method has sufficient accuracy, it is necessary to develop technical evaluation criteria for the developers of the calculation method.

For use by users and related technical personnel.

Users of the calculation method and any relevant parties who need to receive its results must ensure that the calculation method can predict fires with sufficient accuracy.

The development process and consequences of a fire. Therefore, the mathematical accuracy of the calculation method and its ability to simulate fire phenomena need to be reliably verified.

There is no fixed requirement for the accuracy of a calculation method; rather, it depends on the actual needs of its application. Not all calculation methods are required to be perfectly accurate.

It has high accuracy, but its error, uncertainty and applicable scope must be clearly defined.

GB/T 31593 "Fire Safety Engineering" is proposed to consist of twelve parts.

---Part 1: Evaluation, Validation, and Validation of Calculation Methods. Provides validation, verification, and sensitivity assessment of calculation methods for fire safety engineering.

Requirements such as degree analysis.

---Part 2: Required Data Types and Information. This section provides information on the data types required for fire safety engineering and how to obtain this data.

Methodological guidelines for identifying whether various data are applicable to different physical, mathematical models or engineering analyses in fire safety engineering.

method.

---Part 3: Fire Risk Assessment Guidelines. Provides information on the scope of application, implementation process, core calculation formulas, and other aspects of fire risk assessment.

Technical requirements such as certainty analysis and evaluation methods.

---Part 4: Setting Fire Scenarios and Selecting Fire Settings. This section provides methods for selecting and setting fire scenarios.

---Part 5: Calculation Requirements for Fire Plumes. This section provides the relevant calculation formulas for fire plumes, used to calculate the flame height of fire plumes.

Characteristic parameters such as mass flow rate and average temperature rise.

---Part 6: Calculation Requirements for Smoke Layers. This section provides relevant calculation formulas for smoke layers, used to calculate the boundaries of smoke layers in indoor spaces.

Characteristic parameters such as surface location, average temperature, and average mass concentration of specific chemical components.

---Part 7: Calculation Requirements for Ceiling Jet Flow. This section provides calculation