

ICS 13.220.01
CCS C 80



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

GB/T 31593.6-2026

Replacing GB/T 31593.6-2015

**Fire safety engineering - Part 6: Requirements governing
algebraic equations for smoke layers**

消防安全工程 第6部分：烟气层的计算要求

(English Translation)

Issued on: March 31, 2026

Implemented on: October 1, 2026

Issued by: State Administration for Market Regulation

Table of Contents

Preface

Introduction

1 Scope

2 Normative References

3 Terms and Definitions

4 Requirements for describing physical phenomena

5 Calculation process

6 Limitations of the calculation formula

7 Input parameters for the calculation formula

8 Scope of application of the calculation formula

9 Calculation Example

Appendix A (Informative) Table of Structure Numbers in this Document and ISO 24678-4:2023

Appendix B (Informative) Example of Formula for Calculating Smoke Layer in Indoor Spaces

B.1 Overview

B.2 Symbol Explanation

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 6 of GB/T 31593 "Fire Safety Engineering". GB/T 31593 has the following parts published.

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

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

---Part 3: Guidelines for Fire Risk Assessment; Evaluation, Validation, and Validation of Calculation Methods;

---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 supersedes GB/T 31593.6-2015 "Fire Safety Engineering Part 6: Calculation Requirements for Smoke Layers" and is consistent with GB/T 31593.6-Compared to 2015, aside from structural adjustments and editorial changes, the main technical changes are as follows.

---Added some terms and definitions (see Chapter 3);

---Changes have been made to the requirements for describing physical phenomena, the limitations of calculation formulas, and the scope of application of calculation formulas (see Chapters 4, 6, and 8).

Chapters 4, 6, and 8 of the 2015 edition);

---Added requirements for consistency between the input parameters of the calculation formula and other evaluation content (see 7.4);

---Added calculation example requirements (see Chapter 9).

This document is modified to adopt ISO 24678-4:2023 "Fire safety engineering calculation formula control requirements - Part 4: Smoke layer".

This document has undergone several structural adjustments compared to ISO 24678-4:2023. Appendix A provides a comparison of this document with ISO 24678-4:2023.

A comparison table of changes in structural numbering.

The technical differences between this document and ISO 24678-4:2023, 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 terms and definitions to the definition notes;

---The content of Chapters 4 through 8 is equivalent to the corresponding 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 formulas related to ceiling jet flow, used to calculate ceiling jet velocity, Characteristic parameters such as average temperature.

---Part 8: Calculation Requirements for Opening Airflow. This section provides calculation formulas related to opening airflow for calculating airflow at opening locations or...

Characteristic parameters such as flue gas mass flow rate.

---Part 9: Guidelines for Personnel Evacuation Assessment. Provides engineering methods and life support for evacuation strategies in fire safety engineering design.

Safety assessment methods.

---Part 10: Calculation Requirements for the Critical Heat Release Rate of Flashover. This section provides calculation formulas related to flashover for calculating the critical heat release rate of a room.

Characteristic parameters such as the critical heat release rate during combustion.

---Part 11: Calculation Requirements for Thermal Radiant Flux in Open Pools. This section provides formulas for calculating thermal radiant flux in open pools.

The formula is used to calculate characteristic parameters such as thermal radiation flux