

# Comparative Study of Chinese and International Standard Systems on Chemical Protective Clothing

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## Abstract

Through the comparative analysis of China's national and international standard systems on chemical protective clothing (CPC), this paper summarizes the differences in classification and minimum performance requirements between several standard systems. The study provides the most basic performance assessment factors for all types of CPC. It can also be observed that the standard systems of European Standards (EN) and the International Organization for Standardization (ISO) have similar classifications and performance requirements for CPC, while China's standard systems (GB) mainly give detailed requirements for emergency team CPC as a supplement for previous international standards.

*Keywords:* Chemical Protective Clothing; Standard; Classification; Performance

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## 1 Introduction

Personal protective equipment (PPE) [1] is specially designed to protect employees from serious workplace injuries or illnesses resulting from contact with chemical, radiological, physical, mechanical, electrical, or other workplace hazards. Chemical protective clothing (CPC) [2-5] is a type of PPE that protects people from chemical-related injuries in their occupational activities. It was not until 1971 that the U.S. Occupational Safety & Health Administration (OSHA) established basic personal protective apparel standards for industry. Therefore for many years, workers were left to their own devices for defense against chemical or biological hazards. Later on, the National Institute for Occupational Safety and Health (NIOSH), the National Fire Protection Association (NFPA), and various industry safety equipment associations joined in [6]. The development, manufacture, and authentication of CPC center on the developed countries and international organizations in Europe and America. These countries and regions were the first to develop CPC, so the standards they have established are relatively well developed. Currently, NFPA standards, European standards (EN), and International Organization for Standardization

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(ISO) standards are the main CPC standards in the world. China did not release its standards for CPC until 2009.

CPC has been widely used in fields such as heavy industry, fire fighting, national defense, and medicine. However, standards for CPC vary greatly due to differences in countries' approaches to formulating such standards, including testing methods and the factors considered during product performance evaluations. This paper summarizes China's national and international standard systems for CPC through a comparative analysis of the standards' different factors for performance control in an attempt to provide a foundation for China's reform on CPC and to improve China's overall standardization levels.

## 2 Methodology

This study selected 44 standards [7-50] within six standard systems for CPC (as shown in Table 1) as the subjects, which were provided by the General Logistics Department, China Armed Forces. The comparative study of these standards involved the following aspects: (1) analysis of release dates of CPC standards in different standard systems; (2) analysis of classification of CPC in different standard systems; (3) analysis of performance factors for CPC in different standard systems to obtain the assessment factors with relatively high weights; and (4) analysis of minimum performance requirements for CPC in different standard systems.

The standards used in this study involve six standard systems. They are the American Society for Testing and Materials (ASTM) standards, EN standards, British Standards (BS), ISO standards, Japanese Industrial Standards (JIS) and China standards (GB). These standard systems and their serial numbers are as shown in Table 1, while the distribution of the standards is shown in Fig. 1. ASTM and EN have the larger share of standards (at 14 and 11, respectively), followed in descending order by nine ISO standards, five JIS standards, four GB standards, and one BS standard.

All these standards encompass testing methods for CPC's protection performance against chemicals, as well as CPC's classification, performance requirements, selection, usage, and maintenance. Table 2 provides detailed information about these standards and the standard organizations.

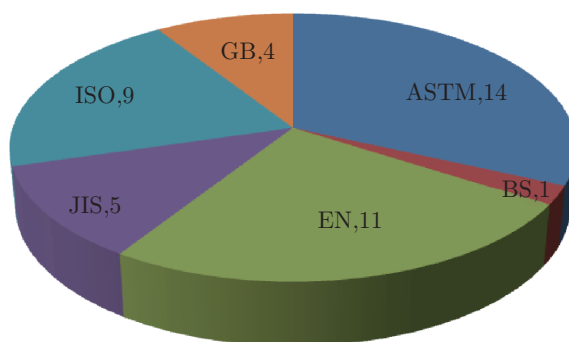


Fig. 1: Distribution of standards for CPC analyzed in the study