

ICS 27.120
CCS F48



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

GB/T 15147-2025

Replacing GB/T 15147-1994

**Penetrant testing for component parts of nuclear fuel
assemblies**

核燃料组件零部件的渗透检验方法

Issued on: October 5, 2025

Implemented on: October 5, 2025

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

Table of Contents

- 1 Scope
- 2 Normative references
- 3 Terms and Definitions
- 4 Method Principles
- 5 Personnel Requirements
- 6 Reagents or materials
- 6.1 Reagents
- 7 Instruments and Equipment
- 8 Testing Step 2 9 records

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 supersedes GB/T 15147-1994, "Penetration Testing Methods for Nuclear Fuel Assembly Components". It is consistent with GB/T 15147-1994. Aside from structural adjustments and editorial changes, the main technical changes are as follows:

---A new chapter on "Terms and Definitions" has been added (see Chapter 3);

---The methodology has been modified (see Chapter 4, Chapter 3 of the.1994 edition);

---Content other than solvent-removable color penetration methods has been removed (see Chapters 5 and 6 of the.1994 edition);

---The instruments and standard test blocks have been modified (see Chapters 6 and 7, Chapter 4 of the.1994 edition);

---The reagents have been changed (see Chapter 6, Chapter 5 of the.1994 edition);

---The detection procedure has been changed (see Chapter 8, Chapter 6 of the.1994 edition). This document was proposed and is under the jurisdiction of the National Nuclear Energy Standardization Technical Committee (SAC/TC58). This document was drafted by: China Nuclear Power Research and Design Institute, Nuclear Industry Standardization Institute, and CNNC Northern Nuclear Fuel Element Co., Ltd. China Nuclear Jianzhong Nuclear Fuel Element Co., Ltd. The main drafters of this document are. Liu Duan, Xu Guiping, Liu Duping, Liu Wei, Luo Jiandong, Wang Zhe, Yang Lei, Zhao Suyu, Zhang

Xiaogang, Zhang Yan, and Ou Jiangwu. The release history of this document and the document it replaces is as follows:

---First published in 1994 as GB/T 15147-1994;

---This is the first revision. Penetrant testing methods for nuclear fuel assembly components

1 Scope

GB/T 15147-2025 is the Chinese national standard on penetrant testing for component parts of nuclear fuel assemblies, in the field of energy and heat transfer engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 5 October 2025 by the State Administration for Market Regulation, Standardization Administration of China, and has been in force since 5 October 2025. Classification: ICS 27.120, CCS F48. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This document specifies the personnel requirements, reagents or materials, and equipment for solvent-removable dye penetrant testing of nuclear fuel assembly components. Preparation, testing procedures, and records, etc. This document applies to solvent-removable dye penetrant testing of surface defects in nuclear fuel assembly components, and also to nuclear fuel assembly parts. Solvent-removing dye penetrant testing for surface defects in weld seams.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included. For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies. This document.

GB/T 9445 Qualification and Certification of Nondestructive Testing Personnel

GB/T 12604.3 Nondestructive Testing Terminology. Penetrant Testing

GB/T 23911 Nondestructive testing - Test blocks for penetrant testing

3 Terms and Definitions

The terms and definitions defined in GB/T 12604.3 apply to this document.

4. Method Principles Penetrant testing is a non-destructive testing method based on capillary action, used to detect open defects on the surface of non-porous metallic and non-metallic specimens. The method. Its basic principle is to utilize the capillary action of liquids to penetrate the open defects on the surface of solid materials, and then use a developer to... The penetrant is reinfiltrated into the developer, and the penetrant traces at the defect are displayed under a certain light source.

5. Personnel Requirements Personnel conducting the testing should be qualified and certified in accordance with GB/T 9445 or a system recognized by all parties to the contract, and obtain relevant penetration testing qualifications. Relevant qualification certificates.

6.1 Reagents

6.1.1 The selection of reagents should be based on the technical requirements for penetrant testing of nuclear fuel assembly components, the types of defects to be detected, and the sensitivity of the test. The requirements will be determined later.