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

**GB/T 9443-2019**

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**Steel and iron castings-Liquid penetrant inspection**

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**(English Translation)**

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### Foreword

This Standard is identical to ISO 4987.1992 "Steel castings - Penetrant inspection" (English edition).

This Standard equivalently translates ISO 4987.1992.

For ease of use, the following editorial changes are made.

- "This International Standard" is modified to be "this Standard";
- "." is used as decimal point to replace the decimal-comma ",";
- Introduction, as required by GB/T 1.1-2000, is inserted into Chapter 2.

This Standard replaces GB/T 9443-1988 "Methods of liquid penetrant inspection and classification of indication for steel castings".

The main differences between this Standard and GB/T 9443-1988 are as follows.

- Scope is added (refer to Chapter 1);
- Normative references is added (refer to Chapter 2);
- Penetrant inspection condition is amended (Chapter 1 in 1988 edition; Chapter 3 in this edition);
- Inspection method is amended (Chapter 2, Chapter 3, Chapter 4, Chapter 5 and Chapter 7 in 1988 edition; Chapter 4 in this edition);

- Acceptance requirement is amended (clause 6.1, clause 6.2 and clause 6.3 in 1988 edition; Chapter 5 in this edition);
- Interpretation of results is amended (clause 6.4 and clause 6.5 in 1988 edition; Chapter 6 in this edition);
- Purchase order list is added (refer to Chapter 7);
- Post-examination cleaning procedure is added (refer to Chapter 8);
- Annex A, annex B and annex C are added;
- Quality level illustration is adjusted and modified (Annex A in 1988 edition and Annex D in this edition).

The annex A, annex B, annex C and annex D of this Standard are informative.

This Standard was proposed by China Machinery Industry Federation

This Standard shall be under the jurisdiction of National Technical Committee 54 on Foundry of Standardization Administration of China (SAC/TC 54).

Drafting organization of this Standard. Shenyang Research Institute of Foundry.

Main drafters of this Standard. Li Xingjie, Zhang Zhaoqian, and Zhang Zhen.

Previous edition replaced by this Standard is as follows.

- GB/T 9443-1988.

Penetrant testing for steel castings

## 1 Scope

This Standard specified the penetrant inspection method for surface discontinuity acceptance criteria when inspection procedure is stipulated in contract according to the requirement of purchaser.

This Standard is applicable to penetrant inspection for steel castings produced by using different kinds of casting method.

**NOTE:** It should be remembered that liquid penetrant inspection, like all methods of non-destructive inspection, forms part of an overall or special assessment which is defined in the contract.

## 2 Normative references

The articles contained in the following documents have become part of this Standard when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this Standard. For the undated documents so quoted, the latest editions shall be applicable to this Standard.

GB/T 18851.1 Non-destructive testing - Penetrant testing - Part 1.General principles (GB/T 18851.1-2005, ISO 3452.1984, IDT)

GB/T 18851.5 Non-destructive testing - Penetrant testing - Part 5.Means of verification (GB/T 18851.5-2005, ISO 3453.1984, IDT)

### **3.1 This Standard only applies to the parts of castings and the percentage of castings to**

be inspected. The conditions shall be clearly indicated on the enquiry, in the request for prices and, more particularly, in the order sent to the supplier and accepted by him.

### **3.2 The manufacturing stage(s) at which the inspection is to be carried out shall be clearly**

defined by agreement between the parties concerned.

### **3.3 For each part of the castings to be inspected, the following shall be indicated.**

- the severity level (see table 1);
  - the type of discontinuity indication (linear or non-linear) (see annex A).
- penetrant indications are listed in annex A.

## **5.2 Severity levels**

Seven severity levels are recognized in accordance with table 1. Depending on the severity level required, it is necessary to carry out the test on a surface corresponding to a given degree of finish (see annex C).

- precision;
- smooth;

- rough.

### **5.2.2 The maximum permissible length for linear or aligned indications varies with**

the casting section thickness  $\delta$ . Three thickness categories are specified.

- $\delta \leq 16$  mm;
- $16 \text{ mm} < \delta \leq 50$  mm;
- $\delta > 50$  mm.

### **5.2.3 Table 1 shows the minimum length below which the indications are not to be**

taken into consideration in the respective category.

### **5.2.4 Examples of non-linear indications, given to a scale of 1, are shown in annex D.**

These have been established in accordance with table 1.

## **6.1 In order to classify discontinuity indications obtained by liquid penetrant inspection**

of the casting, it is necessary to place a frame measuring 105 mm x 148 mm positioned in the most unfavorable location relative to the indications being evaluated. The test is considered satisfactory if the indications being evaluated are less severe or equal to those specified in the order.

## **6.2 Indications are equivalent when they show the same clusters of non-linear indications or the same length of linear indications of similar appearance.**

## **6.3 The types of indications are given only as a guide and the classification by severity**

level is based on the length of the discontinuities, in accordance with table 1.

## **6.4 Aligned and non-aligned indications shall be taken into account for the calculation of**

the cumulative length.