

ICS 25.120.20

CCS J31



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

GB/T 7143-2025

Replacing GB/T 7143-2010

Methods for chemical analysis of silica sand for foundry

铸造用硅砂化学分析方法

Issued on: February 28, 2025

Implemented on: September 1, 2025

**Issued by: the State Administration for Market Regulation,
Standardization Administration of the People's Republic of China**

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Foreword

This document was issued on 28 February 2025 by the the State Administration for Market Regulation, Standardization Administration of the People's Republic of China and takes effect on 1 September 2025.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies.

The document runs to 24 pages in translation. The identification, the dates, the table of contents and the clauses reproduced on this page are taken from the standard itself.

GB/T 7143-2025 Methods for chemical analysis of silica sand for foundry English, Anglais, Englisch, Inglés, ???

It replaces GB/T 7143-2010, which is superseded.

1 Scope

GB/T 7143 is the Chinese standard for the chemical analysis of foundry silica sand. Moulding sand is bought by the tens of thousands of tonnes and paid for on its analysis: the silica content, and the iron, alumina, calcium, magnesium and alkali oxides that come with it, decide the refractoriness of the mould and whether the casting comes out clean. The standard specifies the methods for determining each of those constituents, together with the loss on ignition and the acid demand value, giving for each the principle, the reagents, the apparatus, the analytical procedure, the calculation of results and the permissible difference between determinations. The 2025 edition, effective 1 September 2025, replaces GB/T 7143-2010. For a sand supplier, a foundry buying sand or a laboratory arbitrating between them, this is the method a certificate of analysis and a dispute both rest on.

This document describes the specimen preparation and test methods for the chemical composition analysis method of silica sand for foundry.

This document is applicable to the determination of chemical composition such as silica, alumina, iron oxide, titanium oxide, calcium oxide, magnesium oxide, potassium oxide and sodium oxide content of natural silica sand, selected quartz sand and artificial quartz sand for foundry.

Note: The measurement methods listed in this document are selected according to specific circumstances.

2 Normative references

The following documents contain requirements which, through reference in this text, constitute provisions of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 601 Chemical reagent - Preparations of reference titration solutions

GB/T 603 Chemical reagent - Preparations of reagent solutions for use in test methods

GB/T 2684 Test methods for foundry sands and molding mixtures

GB/T 5611 Foundry terminology

GB/T 6682 Water for analytical laboratory use - Specification and test methods

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

GB/T 21114-2019 Refractories - Chemical analysis by X-ray fluorescence(XRF) - Fused cast-bead method

3 Terms and definitions

The terms and definitions defined in GB/T 5611 are applicable to this document.

4 Preparation of test samples

4.1 The sample shall be representative and homogeneous and free from foreign impurities.

4.2 The measurement sample is divided by the quartering method (if the particles are too large, they should be crushed to less than 0.8 mm first, and the iron introduced in the crushing process should be removed with a magnet, and then divided). Finally, about 20g of a sample is obtained and ground until all passes through a 75µm sieve (i.e. No. 200 sieve). Put the above sample in a weighing bottle, dry it at 105 °C ~ 110 °C for 2 hours, then put it in a desiccator, and cool it for later use.

5 Test methods

5.1 General

5.1.1 Unless otherwise specified, the standard solutions, preparations and preparations used in the analysis are prepared according to the provisions of GB/T 601 and GB/T 603. Use reagents confirmed to be analytical purity and third-grade water according to GB/T 6682. For the reagents used in the test, if the concentration is not indicated, the original concentration is the factory.

5.1.2 All test methods need to be measured twice in parallel, and the average value is used as the final test result; The judgment of test results shall be carried out according to the rounded value comparison method in GB/T 8170.

5.2 Determination of silica content

5.2.1 Determination of silicon dioxide content by hydrochloric acid one-step dehydration - Molybdenum blue spectrophotometric combined method

5.2.1.1 Principle

The sample is melted and decomposed with sodium carbonate, the frit is dissolved with hydrochloric acid, evaporated and dried up to dehydrate silicic acid, added hydrochloric acid to dissolve soluble salts, filtered and burned into silica, and then treated with hydrofluoric acid to make silicon escape in the form of silicon tetrafluoride. The quality difference before and after hydrofluoric acid treatment is the amount of silica in the precipitate.

5.2.1.2 Reagents and materials

The reagents and materials used in the test mainly include:

- a) Anhydrous sodium carbonate;
- b) Hydrochloric acid;
- c) Hydrofluoric acid;
- d) Ethanol solution: 95%;
- e) Hydrochloric acid: 1+1;
- f) Hydrochloric acid: 1+11;
- g) Hydrochloric acid: 5+95;
- h) Sulfuric acid: 1+1;
- i) Potassium thiocyanate solution: 5%;
- j) Silver nitrate solution: 1%;
- k) Potassium fluoride solution: 2%;

- l) Boric acid solution: 2%;
- m) Potassium hydroxide solution: 20%, stored in a plastic bottle;
- n) Ammonium molybdate solution: 5%;
- o) Ascorbic acid solution: 2%, prepared fresh before use;
- p) Silicon dioxide standard solution: 0.1mg/mL. Accurately weigh 0.1000g of silicon dioxide (primary standard reagent) pre-calcined at 1000 degrees C for 1 hour into a platinum crucible. Add 2g of anhydrous sodium carbonate, mix uniformly, heat at low temperature initially, then gradually raise the temperature to 1000 degrees C until a transparent melt is obtained. Cool, transfer to a plastic beaker, leach with boiling water and rinse the crucible with water. Cool to room temperature, transfer to a 1000mL volumetric flask, dilute to the mark with water, shake well, and store in a plastic bottle. Each milliliter of this solution is equivalent to 0.1mg of silicon dioxide;
- q) p-Nitrophenol indicator ethanol solution: 5g/L.

5.2.1.3 Instruments

The main instruments used in the test are as follows:

- a) Analytical balance: accuracy of 0.0001g;
- b) Platinum crucible: 30mL~100mL;
- c) High-temperature box-type resistance furnace;
- d) Single-mark pipette: 5mL, 10mL, 25mL, Class A;