

ICS 91.100.10

CCS Q12



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

GB/T 27690-2023

Silica fume for cement mortar and concrete

砂浆和混凝土用硅灰

Issued on: March 17, 2023

Implemented on: October 1, 2023

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

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Foreword

This document was issued on 17 March 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 October 2023.

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

1 Scope

GB/T 27690-2023 covers silica fume, the very fine condensed silicon dioxide collected from the vapour given off when ferrosilicon alloy or industrial silicon is smelted, when that material is used in mortar and concrete. Grades are set by silicon dioxide content, grade 85 and grade 90, and the product is split again by whether it has been densified, with a bulk density of 350 kilograms per cubic metre marking the line between the two. The requirements clause lists what a delivered batch has to meet, and three normative annexes carry the methods that decide it: bulk density, water demand ratio and activity index, and inhibition of alkali-aggregate reactivity. Inspection rules make 40 tonnes of one type an inspection batch and fix sampling and sample retention, and the final clause deals with packaging, labelling, transport and storage, down to the weight tolerance on a bag. Silica fume is a by-product, so its quality follows whatever the smelter happened to be doing; the activity index is what separates material that genuinely raises strength and density from expensive filler, and the alkali-aggregate test matters because the concrete it goes into may

sit for decades against reactive aggregate. For cement and concrete producers, admixture suppliers and site testing laboratories.

This document specifies the classification and marking, requirements, test methods, inspection rules, packaging, labeling, transportation and storage of silica fume for mortar and concrete.

This document applies to silica fume for mortar and concrete.

2 Normative references

The following referenced documents are indispensable for the application 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 176, Methods for chemical analysis of cement

GB/T 1345, The test sieving method for fineness of cement

GB/T 2419, Test method for fluidity of cement mortar

GB 6566, Limits of radionuclides in building materials

GB 8076, Concrete admixtures

GB/T 17671, Test method of cement mortar strength (ISO method)

GB/T 19587, Determination of the specific surface area of solids by gas adsorption using the BET method

GB/T 50082, Standard for test methods of long-term performance and durability of ordinary concrete

JC/T 681, Planetary cement mortar mixer

JGJ 63, Standard of water for concrete

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 silica fume

When smelting ferrosilicon alloy or industrial silicon, the silicon vapor discharged through the flue is collected to obtain a powder material with amorphous silicon dioxide as the main component.

3.2 non-densified silica fume

Silica fume that is directly collected without densification treatment and has a bulk density not exceeding 350 kg/m³.

3.3 densified silica fume

Silica fume that the non-densified silica fume is densified and the bulk density is increased to more than 350 kg/m³.

4 Classification and marking

4.1 Product classification

4.1.1 According to the silicon dioxide content, it is divided into grade 85 silica fume (code SF85) and grade 90 silica fume (code SF90).

4.1.2 According to the bulk density, it is divided into non-densified silica fume (code is R) and densified silica fume (code is D).

4.2 Product marking

The product mark consists of the silica content classification code, bulk density classification code and standard number.

Example. The marking for grade 90 densified silica fume is as follows.

SF90-D GB/T27690

5 Requirements

5.1 Bulk density

The bulk density of non-densified silica fume shall not be greater than 350 kg/m³. The bulk density of densified silica fume shall be greater than 350 kg/m³.

5.2 Technical requirements

The performance indicators of silica fume used in mortar and concrete shall comply with the requirements of Table 1.

Table 1 -- Performance indicators of silica fume for mortar and concrete

cement content of the reference concrete mix ratio shall be 400 kg/m³ +/-5 kg/m³. The sand content shall be 38%+/-2%. The slump is adjusted by the amount of water. The slump is controlled at 80 mm+/-10 mm. 10% silica fume is added to the tested concrete

(an equal amount replaces cement). The tested concrete has the same mix ratio as the reference concrete. The slump of the tested concrete is adjusted by using a standard high-efficiency water-reducing agent or a standard high-performance water-reducing agent that complies with the provisions of GB 8076.

7 Inspection rules

7.1 Batch number, sampling and sample retention

7.1.1 Batch number

40 t of the same type of silica fume is considered as one inspection batch. If it is less than 40 t, it is considered as one inspection batch.

7.1.2 Sampling

The sampling shall be representative. It can be continuous or equal amount of samples can be taken from more than 10 different parts. The total amount shall be at least 5 kg. The specimens shall be mixed evenly.

7.1.3 Sample retention

The same batch of silica fume specimens from the manufacturer shall be divided into two equal parts. One part is used for product inspection before leaving the factory. The other part is sealed and stored for 6 months for re-inspection or arbitration.

7.2 Inspection

7.2.1 Exit-factory inspection

The exit-factory inspection items for each batch of silica fume include bulk density, silicon dioxide content, moisture content, loss on ignition, fineness, water demand ratio and activity index.

7.2.2 Type inspection

Type inspection shall include all items in Chapter 5. Type inspection shall be carried out in any of the following cases.

- a) Pre-production and testing of new products or old products for transfer to other factories.
- b) After formal production, if there are major changes in materials and processes,