

ICS 81.080

CCS Q 44



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

GB/T 23294-2021

Replacing GB/T 23294-2009

Abrasion resistant refractory materials

耐磨耐火材料

Issued on: May 21, 2021

Implemented on: December 1, 2021

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

Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	7
4 Classification and designation...	7
5 Technical requirements...	8
6 Test methods...	12
7 Quality assessment procedure...	13

1 Scope

China's national product standard for abrasion resistant refractory materials. It specifies the classification, the technical requirements, the test methods, the inspection rules and the marking, packaging, transport and storage of refractories whose service requirement is resistance to wear. Most refractories are specified against heat and against chemical attack. This class is specified against a third thing: solid particles moving fast against the lining. That is the governing condition in a catalytic cracker, where catalyst circulates as a fluidised powder at high velocity and erodes anything in its path; in a circulating fluidised bed boiler; in a cyclone, a transfer line or a riser; in a coal gasifier; and in the ducting of any plant carrying hot dust. In those services a refractory with excellent thermal properties and poor wear resistance is worn through in months, and the failure is not gradual - once the lining is breached at one point the hot abrasive stream cuts into the shell behind it. What gives wear resistance is a hard, dense, well-bonded matrix rather than a highly refractory one, and the materials are consequently low-cement or ultra-low-cement castables and gunning mixes with hard aggregates, usually installed monolithically over anchors rather than laid as brick. The standard therefore makes abrasion resistance a specified and measured property, determined by a defined test at ambient and at elevated temperature rather than inferred from strength, and sets it alongside the cold crushing strength, the bulk density and porosity, the permanent linear change, the thermal conductivity and the installation-related properties - because a material of this kind is placed by a contractor on site, and how it is mixed, placed and cured determines whether it reaches the properties specified. Issued on 21 May 2021 and in force since 1 December 2021, it replaces GB/T 23294-2009.

This Standard specifies the terms and definitions, classification and designation, technical requirements, test methods, quality assessment procedures, packaging, marks,

transportation, storage and quality certificates for abrasion resistant refractory materials. This Standard is applicable to the abrasion resistant refractory materials used for the equipment such as circulating fluidized bed boiler, municipal solid waste incinerator, industrial waste incinerator, medical waste incinerator, ordinary solid waste incinerator, hazardous waste incinerator, and petroleum catalytic cracking units.

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 2997, Test method for bulk density, apparent porosity and true porosity of dense shaped refractory products

GB/T 3001, Refractory products - Determination of modulus of rupture at ambient temperature

GB/T 4513.2, Monolithic (unshaped) refractory products - Part 2: Sampling for testing

GB/T 4513.3, Monolithic (unshaped) refractory products - Part 3: Characterization as received

GB/T 4513.5, Monolithic (unshaped) refractory products - Part 5: Preparation and treatment of test pieces

GB/T 4513.6, Monolithic (unshaped) refractory products - Part 6: Measurement of physical properties

GB/T 4984, Chemical analysis of refractories containing zirconia

GB/T 5070, Magnesite-chrome refractories Methods for chemical analysis

GB/T 30873, Refractory materials - Determination of thermal shock resistance

GB/T 50080, Standard for test method of performance on ordinary fresh concrete YB/T 4130, Refractory materials - Determination of thermal conductivity (calorimeter)

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB/T 10325 as well as the followings apply.

3.1 abrasion resistant refractory material refractory material with Al_2O_3 , SiC or SiO_2 as main components with excellent wear resistance under the conditions of use

4 Classification and designation

4.1 Abrasion resistant refractory materials are divided into four categories: abrasion resistant refractory bricks, abrasion resistant refractory castable, abrasion resistant refractory plastics and abrasion resistant refractory mud.

4.2 Abrasion resistant refractory bricks are divided into 7 designations according to physical and chemical indicators: NMZ-1, NMZ-2, NMZ-3, NMZ-4, NMZ-5, NMZ-6, NMZ-7.

4.3 Abrasion resistant refractory castable (applicable to circulating fluidized bed boilers and waste incinerators) is divided into 8 designations according to physical and chemical indicators: NMJ-1, NMJ-2, NMJ-3, NMJ-4, NMJ-5, NMJ-6, NMJ-7 and NMJ-8.

4.4 Abrasion resistant refractory castable and plastics (applicable to petroleum catalytic cracking units) are divided into 7 designations according to physical and chemical indicators: NM-A, NM-B1, NM-B2, NM-C1, NM-C2, NM-C3, NM-C4.

4.5 Abrasion resistant refractory plastics are divided into 7 designations according to physical and chemical indicators: NMK-1, NMK-2, NMK-3, NMK-4, NMK-5, NMK-6, NMK-7.

4.6 Abrasion resistant refractory mud is divided into 4 designations: NMN-1, NMN-2, NMN-3, NMN-4 according to physical and chemical indicators.

4.7 In the designation, NM is the initials for Nai Mo (Chinese Pinyin, meaning abrasion resistant); Z, J, K, and N are the initials of Chinese Pinyin for brick, castable, plastic, and mud respectively. Among the designations in Table 3, A, B, and C are high abrasion resistant, abrasion resistant, and heat insulation abrasion resistant respectively. The following number is the product serial number.

5 Technical requirements

5.1 The physical and chemical indicators of abrasion resistant refractory bricks shall meet the requirements of Table 1.

5.2 The physical and chemical indicators of abrasion resistant refractory castable (applicable to circulating fluidized bed boilers and waste incinerators) shall meet the requirements of Table 2.

5.3 The physical and chemical indicators of abrasion resistant refractory castable and plastics (applicable to petroleum catalytic cracking units) shall meet the requirements of Table 3.

5.4 The physical and chemical indicators of abrasion resistant refractory plastics shall meet the requirements of Table 4.

5.5 The physical and chemical indicators of abrasion resistant refractory mud shall meet the requirements of Table 5.

5.6 The allowable size deviation and appearance of abrasion resistant refractory bricks

shall meet the requirements of Table 6.

6.8 The thermal shock resistance is determined according to GB/T 30873.

6.9 The determination of the permanent heating line change and the recommended maximum use temperature shall be carried out in accordance with GB/T 5988.

6.10 The thermal conductivity can be determined by GB/T 5990, GB/T 22588 and YB/T 4130 according to the material and thermal conductivity.

6.11 The determination of the starting temperature of abrasion resistant refractory bricks under load is carried out according to GB/T 5989.

6.12 The size, appearance and cross-section inspection of abrasion resistant refractory bricks shall be carried out according to GB/T 10326.

6.13 The determination of the initial setting time and final setting time of abrasion resistant refractory castable is carried out according to GB/T 50080.

6.14 The plasticity index of abrasion resistant refractory plastics is determined according to GB/T 4513.3.

6.15 The bonding time of abrasion resistant refractory mud is determined according to GB/T 22459.3.

7 Quality assessment procedure

7.1 Batching Products are batched according to the same designation. Each batch of abrasion resistant refractory bricks does not exceed 150t. Abrasion resistant refractory castable and abrasion resistant refractory plastics do not exceed 100t per batch. Each batch of abrasion resistant refractory mud does not exceed 30t. When raw materials or production processes are changed, separate batching shall be made.

7.2 Rules for sampling and qualification determination

7.2.1 Sampling acceptance of abrasion resistant refractory bricks shall be carried out according to GB/T 10325. Sampling of abrasion resistant refractory castable, abrasion resistant refractory plastics and abrasion resistant refractory slurries shall be conducted in accordance with GB/T 4513.2.