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**INDUSTRY STANDARD OF THE
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**Preparation of specimen for unshaped refractories - Part 1:
Refractory castables
(English Translation)**

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Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	5
4 Principle...	6
5 Laboratory and equipment...	6
6 Sampling...	8
7 Specimen specifications...	8
8 Flowability test...	9
9 Specimen molding...	10
10 Specimen curing...	10
11 Specimen drying...	11
12 Test report...	11

1 Scope

This Part specifies the definition and test method of the fluidity of dense and insulating refractory castables, as well as the molding equipment, molding method, curing, drying conditions for specimen preparation.

This Part is applicable to the determination of flowability and specimen preparation of dense and insulating refractory castables.

2 Normative references

The provisions in following documents become the provisions of this Part through reference in this Part. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Part; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 17617-1998 Rule of sampling and inspection for refractory raw materials

3 Terms and definitions

This Part adopts the following terms and definitions

3.1

Flowability

The measurement of the flow performance of refractory castables under the action of their own weight (and/or) external force after adding water or other liquid binders and stirring evenly. It is expressed as the vibration flowability D_f :

Where:

D_f - Flowability, %;

D - Average spread diameter of castables under the action of its own weight (and/or) external force, in millimeters (mm).

3.2

Cure

The process of keeping refractory castables for a certain period of time under specified temperature and humidity conditions to obtain strength after molding.

4.1 Fluidity test

After adding different amounts of water or other liquid binders and stirring evenly, the refractory castable is loaded into a conical mold on a vibration table; the conical mold is removed. The average spreading diameter is measured under the action of a certain time and a specified frequency and amplitude.

4.2 Specimen preparation

The amount of water (or other liquid binders) determined by the fluidity test is added to the refractory castable; after a certain period of time in a mixer, it is evenly stirred, molded, cured, dried under specified conditions.

5 Laboratory and equipment

5.1

Laboratory

The temperature of the laboratory shall be maintained at 15 °C ~ 25 °C;

the relative humidity shall not be less than 50%.

5.2

Specimen curing box

The curing box shall be able to maintain a relative humidity of not less than 90% and a temperature of 20 °C $\pm$ 1 °C.

5.3

Mixer

The working principle of the mixer is shown in Figure 1. The mixing barrel and mixing blades shall have sufficient strength.

5.3.1

Mixing barrel

Capacity 5 L ~ 10 L, mainly used for flowability determination;

capacity 10 L ~ 30 L, mainly used for specimen preparation.

5.3.2

Mixing blade

The shape of the blade shall match the internal shape and size of the mixing barrel. The mixing blade can revolve around the A axis (the symmetry axis of the mixing barrel) and rotate in the opposite direction around the B axis (the symmetry axis of the mixing blade). The speeds are:

and flowability of the test material. Each measurement shall not use materials that have been vibrated. The preparation of the specimen material and the two measurements shall be completed within 10 min.

8.2.5 There is no need to tamp the self-flowing castables when adding it; no vibration is required after the material is filled. After removing the cone mold, stay for 1 min and measure the flowability according to 8.2.3 ~ 8.2.4.

8.3 Determination of the amount of water (or other liquid binder) added

The test materials with different water addition amounts are used to measure the fluidity.

When the flowability reaches 60% ~ 90%, it is the appropriate amount of water and is used as the amount of water used for specimen molding.

9 Specimen molding

9.1

Weigh the amount of specimen required for molding from the uniformly mixed test material; add the amount of water (or other liquid binder) determined according to 8.3.

9.2

Prepare the test material according to 8.1.3.

9.3

Fix the test mold on the vibration table; fill the test material to the upper edge of the test mold; start the vibration table; fill the test material while vibrating.

9.4

Stop vibration; use a trowel to remove the test material that is higher than the edge of the test mold; smoothen the surface of the specimen. For dense castables, the total vibration time is generally 60 s ~ 90 s; for thermal insulation castables, the total vibration time is generally 30 s ~ 60 s. The total time from the start of water addition to specimen molding does not exceed 10 min.

9.5

For the molding of self-flowing castable samples, directly fill the evenly mixed test material into the test mold; leave it for 2 minutes; then smoothen it with a trowel.

9.6 When the client provides the specimen preparation and curing method, the method

provided by the client shall prevail and shall be noted in the inspection report.

10 Specimen curing

10.1

Air-hardening refractory castables

The specimen with the mold is placed in the laboratory environment for curing for 24 hours, demolded, stored for another 24 hours under the same conditions.

10.2

Water-hardening refractory castable specimen

The mold is placed in a curing box with a relative humidity of not less than 90% and a temperature of $20\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. After curing for 24 hours, it is demolded and cured for 24 hours under the same conditions.

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