

**STEEL FOUNDERS' SOCIETY OF AMERICA**  
*Tentative Specification for*  
**CHROMITE SAND AND FLOUR**

**SFSA DESIGNATION: 16 T-67**

ISSUED: 1967

This Tentative Specification has been approved by the Society's Specifications Committee and reviewed by the material producers. The Tentative Specification shall be in effect for two (2) years, and if not revised in that time, it shall be advanced to Standard. Suggestions for revisions should be addressed to the Steel Founders' Society at Westview Towers, 2 1010 Center Ridge Road, Rocky River, Ohio 44116.

**1. Scope**

**1.1 Chromite sand**

1.1.1 Primarily for use as either a molding sand or as a core sand in the production of steel castings.

1.1.2 Foundry grade chromite sand is derived from naturally occurring chrome ore deposits. The grains are irregularly shaped, angular and commonly with somewhat curved faces. The color is jet black with a metallic luster.

**1.2 Chromite flour**

1.2.1 As an additive to chromite sand when used as indicated in 1.1.1 above.

**2. Geographic location of Source**

2.1 Information as to the source of the chromite sand must be made available by the vendor at the request of the purchaser.

**3. Acknowledgment**

3.1 When specified, a vendor shall indicate this specification number in all quotations when acknowledging purchase orders.

**4. Quality**

4.1 The material shall be of a uniform black color, clean and free from foreign materials.

**5. Identification**

5.1 All bagged material shall be plainly marked "Chromite Sand" or "Chromite Flour" in a color contrasting to that of the container.

5.2 Each bag may further be identified by a distinctive brand name.

5.3 The name of the vendor or supplier shall be legibly stamped on each bag.

5.4 The quantity or weight shall be legibly marked on each bag.

**6. Sample Preparation**

6.1 The number of bags to be sampled by the consumer for a routine check of the technical requirements shall be a minimum of 5 bags taken at random to make a 10-pound composite sample.

6.2 The sample so taken shall be representative of the contents of the bags selected.

6.3 Sample reduction shall be by quartering until a 2.5-pound laboratory sample is secured.

6.3.1 An alternate method for reducing the gross sample is by the use of a sample splitter which is described in the AFS "Foundry Sand Handbook," Seventh Edition, Section 3.

6.4 Identification of sample shall indicate material, producer, supplier, source of shipment, and date shipment was received.

6.5 In case of a dispute between supplier and purchaser, the number of bags to be sampled shall be according to ASTM C322.

6.5.1 The number of samples shall depend on the number of units in a shipment. When a shipment consists of 100 bags or less, the number of bags sampled at random shall be preferably 10 bags but not less than 5. When the shipment is greater than 100 and less than 500, the number of bags sampled shall be not less than 15.

**7. Technical Requirements**

**7.1 Moisture Content**

7.1.1 The moisture content of the sand shall not exceed 0.5 0 percent.

**7.2 Chemical Composition**

7.2.1 The chemical composition shall conform to the following limitations:

Cr <sub>2</sub> O <sub>3</sub>	44.00 percent minimum
FeO	26.00 percent maximum
SiO <sub>2</sub>	3.00 percent maximum
CaO	1.00 percent maximum
Al <sub>2</sub> O <sub>3</sub>	
MgO and trace elements	Balance

7.2.2 The vendor, upon request, shall furnish to the purchaser a certified representative analysis within 30 days of shipment.

### 7.3 pH Value.

7.3.1 The pH of the sand shall be between 7.0 and 9.0.

### 7.4 Acid Demand Value

7.4.1 The acid demand value shall conform in general to the following :

At pH	3	4	5
Not to exceed	10 ml	8 ml	6 ml

### 7.5 Loss on Ignition

7.5.1 The loss on ignition as determined under an atmosphere of oxygen-free nitrogen shall not exceed 0.50 percent.

### 7.6 Sieve Analysis

7.6.1 Sieve analyses shall be made on a 100- or 250-gram sample of chromite sand or flour.

7.6.2 The sizes of the sieves shall be in accordance with the National Bureau of Standards series as given in ASTM E 11.

7.6.3 The U.S. Standard sieve numbers to be used in the sieve analysis shall be as follows:

#### 7.6.3.1 For sand analysis

Sieve No.	Sieve Opening in Inches
16	0.0469
20	0.033 1
30	0.02 34
40	0.0 165
50	0.0117
70	0.0083
100	0.0059
140	0.0041
200	0.0029
270	0.002 1
Pan	

#### 7.6.3.2 For chromite flour

Sieve No.	Sieve Opening in Inches
140	0.004 1
200	0.0029

### 7.6.4 Classification of Chromite Sand

7.6.4.1 Three grades of chromite sand are recommended, SFSA Nos. S-50, S-65 and S-SO. The recommended classification for each grade is given in Table I.

**TABLE I-SIEVE CLASSIFICATION RANGES FOR VARIOUS SFSA GRADES OF CHROMITE SAND**

Sieve Number	SFSA S-SO Percent	SFSA S-65 Percent	SFSA S-80 Percent
16	100 Pass	100 Pass	—
20	—	—	100 Pass
50	40 Max. Ret'd	30 Max. Ret'd	20 Max. Ret'd
200	95 Min. Ret'd	90 Min. Ret'd	85 Min. Ret'd

7.6.4.2 Two grades of flour are recommended, SFSA Nos. F-140 and F-300. The recommended classification for each grade is given in Table II.

**TABLE II-SIEVE CLASSIFICATION RANGES FOR VARIOUS SFSA GRADES OF CHROMITE FLOUR**

Sieve Number	SFSA F-140 Percent	SFSA F-300 Percent
140	100 Pass	100 Pass
200	50 Max. Retained	10 Max. Retained
200	—	90 Min. Pass

### 7.7 AFS Clay Substance

7.7.1 The clay substances (particles less than 20 microns) shall not exceed 0.75 percent for any of the three SFSA grades of sand.

### 7.8 Specific Gravity

7.8.1 The average specific gravity of chromite sands is 4.4.

7.8.2 It shall not be required that this property be determined by the vendor or the foundry.

## 8. Acceptance Tests

### 8.1 Moisture content

8.1.1 Dry a small sample, e.g., 2 5 grams, to a constant weight at 220- 230 degrees F for 1 hour and cool in a dessicator.

8.1.2 Moisture content in percent =

$$\frac{\text{Loss in weight}}{\text{Original weight}} \times 100$$

### 8.2 Chemical Composition

8.2.1 Chemical analysis shall be made in accordance with the procedure outlined in "Standard Methods for Chemical Analysis of Chrome-Containing Refractories and Chrome Ore," ASTM Designation: C5 72 -65.

### 8.3 pH Value

8.3.1 Stir together for at least 5 minutes a 50-gram sample of chromite sand in 100 ml of distilled water.

8.3.2 Measure the pH of the supernatant liquid at short intervals, with repeated stirring, until constant. (See Note 1)

## 8.4 Acid Demand Value

8.4.1 Stir together for at least 5 minutes, 50 grams of chromite sand, 50 ml of distilled water and 50 ml of N/10 HCl.

8.4.2 Allow to stand for a minimum period of 1 hour and back-titrate the resulting solution with N/10 NaOH solution to pH 3, 4 and 5.

**8.4.3** The amount of acid consumed at each pH level gives the acid demand value of the sand. (See Note 1)

**NOTE 1**—The pH is determined at room temperature preferably by electrometric methods.

## 8.5 Loss on Ignition

8.5.1 Calcine a dry sample of chromite sand weighing a minimum of 4 grams to constant weight at 1450 - 1800 degrees F for 30 minutes, using an inert furnace atmosphere such as a slow stream of oxygen-free nitrogen. (See Note 2.) Cool to below red heat in this atmosphere and subsequently to room temperature in a dessicator.

8.5.2 Loss on ignition in percent =

$$\frac{\text{Loss in weight}}{\text{Original weight}} \times 100$$

**NOTE 2**—With minor modifications, tube furnaces used for combustion methods of carbon or sulfur determination could be employed. Fused silica combustion boats are suitable.

## 8.6 Sieve Analysis

**8.6.1** The sieve analysis of chromite sand shall be performed according to the standard procedure de-

scribed in the AFS Foundry Sand Handbook, Seventh Edition, Section 5, pages 4 and 5.

8.6.2 The sieve analysis of chromite flour shall be performed according to the wet procedure described in the AFS Foundry Sand Handbook, Seventh Edition, Section 5, pages 26 and 28.

## 8.7 AFS Clay Substance

8.7.1 The clay substances shall be determined according to the standard procedure described in the AFS Foundry Handbook, Seventh Edition, Section 5, pages 5 to 8.

## 9. Bagging

9.1 The chromite sand shall be bagged in such a manner as to insure that the sand is not exposed to moisture and is protected against shipping loss.

9.2 The chromite sand shall be bagged in sacks that hold a maximum of 105 pounds.

9.3 Each bag shall be legibly marked or tagged with the following information:

**9.3.1** "Chromite Sand" or "Chromite Flour."

**9.3.2** Quantity or weight.

**9.3.3** Vendor's name or supplier's name.

## 10. Rejection

10.1 Material not conforming to the specification will be subject to rejection by the foundry.