



Standard Specification for Aluminum Silicate Pigments (Anhydrous)¹

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^{ε1} NOTE—Keywords were added editorially in May 1996.

1. Scope

1.1 This specification covers the white pigments that consist substantially of anhydrous (calcined) natural aluminum silicates² (of the 1+1 layer type) and are restricted to those minerals which conform to the chemical compositional limits prescribed herein and which can be suitably processed to what is known as paint pigment quality.

2. Referenced Documents

2.1 ASTM Standards:

D 281 Test Method for Oil Absorption of Pigments by Spatula Rub-Out³

D 718 Test Methods for Analysis of Aluminum Silicate Pigment⁴

D 1203 Test Methods for Volatile Loss from Plastics Using Activated Carbon Methods⁵

D 1483 Test Method for Oil Absorption of Pigments by Gardner-Coleman Method³

D 2448 Test Method for Water-Soluble Salts in Pigments by Measuring the Specific Resistance of the Leachate of the Pigment⁴

D 3360 Test Method for Particle Size Distribution by Hydrometer of the Common White Extender Pigments⁴

E 70 Test Method for pH of Aqueous Solutions with the Glass Electrode⁶

3. Composition and Properties

3.1 *Preparation*—The pigment shall be made by grinding, milling, washing, purifying, or otherwise processing, natural hydrous aluminum silicates followed by heat treatment (calcination) sufficient to reduce the residual percent loss on ignition to a maximum of 0.5 % and otherwise conforming to the composition requirements (weight percent) given in Table 1.

TABLE 1 Pigment Composition Requirements (Percent by Weight)

NOTE 1—The major constituents shown in the analysis are combined as complex aluminum silicate and do not exist as free oxides.

	Ideal	Typical	Range	Max
Aluminum oxide, Al ₂ O ₃ , %	45.91	44.4	43-49 ^A	...
Silicon dioxide, SiO ₂ , %	54.09	52.3	56-50 ^B	...
Iron oxide, Fe ₂ O ₃ , %	...	0.1	...	0.
Titanium dioxide, TiO ₂ , %	...	2.0	...	2.5
Calcium oxide, CaO, %	0.1
Sodium oxide, Na ₂ O, %	0.1
Potassium oxide, K ₂ O, %	0.1
Other oxides, %	0.1
Free moisture (105°C), %	...	<0.5	...	0.5
Loss on ignition (1000°C), %	...	<0.5	...	0.5
Free silica (either amorphous or as crystalline quartz), %	1.0

^A Permitting up to about 5 % excess Al₂O₃, for example, as allophane.

^B Permitting up to about 5 % excess SiO₂, for example, but no more than 1 % of free silica (SiO₂) either amorphous or as crystalline quartz.

3.2 *pH*—The pH of a water slurry of the pigment shall be within a range from 4.5 to 5.5 unless otherwise agreed upon between the purchaser and the seller.

3.3 *Water-Soluble Matter*—The water-soluble matter shall be not more than 0.60 %.

3.4 *Wet-Sieve Residue*—The pigment shall contain no more than 0.02 % wet-sieve residue retained on a 45 μm (No. 325) sieve (grit or coarse particles) except as may be agreed upon between the purchaser and the seller.

3.5 *Brightness (Color)*—The brightness (color reflectance) shall conform to the following requirements:

3.5.1 The brightness shall be not less than 90 % nor more than 92 % expressed as percent reflectance of standard illuminant C at 457 nm compared to a freshly smoked magnesium oxide surface by means of an accepted integrating sphere reflectance spectrophotometer or a monochromatic reflectance meter, or

3.5.2 The color may be specified by actual determination of dominant wavelength, hue, and spectral efficiency as can be calculated from the tristimulus integration of the reflectance curve, or

3.5.3 The color shall be equal, within agreed upon tolerances, to that of a reference standard agreed upon between the purchaser and the seller.

¹ This specification is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.31 on Pigment Specification.

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² Synonymous terms are kaolinite and china clay.

³ *Annual Book of ASTM Standards*, Vol 06.01.

⁴ *Annual Book of ASTM Standards*, Vol 06.03.

⁵ *Annual Book of ASTM Standards*, Vol 08.01.

⁶ *Annual Book of ASTM Standards*, Vol 15.05.