



Standard Specification for Zinc Oxide Pigments¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the pigments commercially known as “zinc white” or zinc oxide. The pigments may be purchased in the dry form or as a paste in oil.

NOTE 1—Zinc oxides are used in many industries. For additional information, see Classification D 4295 and Test Methods D 4315 for descriptions of zinc oxide use in rubber compounding.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 ASTM Standards:²

- D 185 Test Methods for Coarse Particles in Pigments
- D 280 Test Methods for Hygroscopic Moisture (and Other Matter Volatile Under the Test Conditions) in Pigments
- D 281 Test Method for Oil Absorption of Pigments by Spatula Rub-out
- D 332 Test Method for Relative Tinting Strength of White Pigments by Visual Observation
- D 1483 Test Method for Oil Absorption of Pigments by Gardner-Coleman Method
- D 2745 Test Method for Relative Tinting Strength of White Pigments by Reflectance Measurements
- D 3280 Test Methods for Analysis of White Zinc Pigments
- D 4295 Classification for Rubber Compounding Materials—Zinc Oxide
- D 4315 Test Methods for Rubber Compounding Material—Zinc Oxide
- E 20 Practice for Particle Size Analysis of Particulate Substances in the Range of .2 to 7.5 μm by Optical Microscopy³

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

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Withdrawn.

3. Significance and Use

3.1 Zinc oxide functions as both a chemical and a pigment. It is used in a variety of applications including rubber, paint, reprography, glass, chemicals, etc. In paint, it contributes to mildew protection, ultraviolet absorption, hiding power, and neutralization of acids formed upon oxidation of the paint film.

4. Composition and Properties

4.1 *Dry Pigment, French Process*—In the manufacture of French process zinc oxide, metallic zinc is vaporized, either in a boiler or a refining column, and the resulting vapor is burned in a controlled manner in an orifice. The fine particles of zinc oxide are cooled enough to agglomerate and are collected by a system of fabric bags. French process oxide shall conform to the properties listed in Table 1.

4.2 *Dry Pigment, American Process*—In the manufacture of American process zinc oxide, zinc ore is reduced in the presence of a carbonaceous fuel. The resulting vapor is burned in a combustion chamber, and the fine particles of zinc oxide are cooled enough to agglomerate and are collected by a system of fabric bags. American process oxide shall conform to the properties listed in Table 1.

4.3 *Paste in Oil*—The paste shall be made by thoroughly grinding the specified pigment with linseed oil. As received it shall not be caked in the container and shall break up readily in oil to form a smooth paint of brushing consistency. The paste shall conform to the following requirements:

Pigment, %	80 to 86
Linseed oil, %	14 to 20
Moisture and other volatile matter, max, %	0.5
Coarse particles and skins (total residue retained on a No. 325 (45- μm) sieve), max, % of the dry pigment	1.5

4.4 In such physical properties as are specified by the purchaser, the pigment shall satisfactorily match a reference sample mutually agreed upon by the purchaser and the seller. The most frequently specified properties are oil absorption, tinting strength, and particle shape. Appropriate test methods are listed in Section 6. In the event that either an acicular type or a nodular (spherical) type of zinc oxide is desired, the particle shape shall be determined by examining or photographing microscopic mounts (1000 \times or more) of the sample