



Designation: D 4139 – 04

Standard Guide for Determining Volatile and Nonvolatile Content of Pigments¹

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1. Scope

1.1 This guide is intended to aid in the selection of the proper ASTM test method for determining the volatile and nonvolatile content of pigments.

NOTE 1—Test methods for determining the composition of the volatile fraction are not covered by this guide.

1.2 The standards included are as follows:

Standard	Section	ASTM Designation
Inert or low hiding pigments	4.1	D 280
White pigments	4.2	D 280
Black pigments	4.3	D 280 D 1509
Aluminum and zinc pigments	4.4	D 280 D 480
Blue pigments	4.5	D 280 D 1135
Green pigments	4.6	D 280
Yellow, orange, brown pigments	4.7	D 280 D 3724
Red pigments	4.8	D 280
Miscellaneous	4.9	

2. Referenced Documents

2.1 ASTM Standards:²

D 280 Test Methods for Hygroscopic Moisture (and Other Matter Volatile Under the Test Conditions) in Pigments

D 480 Test Methods for Sampling and Testing of Flaked Aluminum Powders and Pastes

D 1135 Test Methods for Chemical Analysis of Blue Pigments

D 1509 Test Methods for Carbon Black—Heating Loss

D 3724 Specification for Synthetic Brown Iron Oxide Pigment

3. Significance and Use

3.1 The nonvolatile content of raw materials may be used to determine the total nonvolatile content (solids) of paint and

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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.

related coatings. Such information may be useful to coatings producers and users for the determination of the total solids available for film formation and for the estimation of the volatile organic content.

4. Procedure

4.1 Inert or Low Hiding Pigments:

4.1.1 Test Methods D 280 contain Method A for pigments that do not decompose at 110°C, using a time of 2 h at 105 to 110°C, and Method B for pigments that decompose at 110°C, using vacuum to remove the volatile material.

4.1.1.1 Test Methods D 280 are applicable to anhydrous and hydrous aluminum silicate, barium sulfate, calcium, borosilicate, calcium carbonate, diatomaceous silica, magnesium silicate, pumice, and wet ground mica pigments for determination of hygroscopic moisture and other matter volatile under the test conditions.

4.2 *White Pigments*—Test Methods D 280 are applicable to titanium dioxide, white lead, and zinc sulfide pigments.

4.3 Black Pigments:

4.3.1 Test Methods D 280 are applicable to synthetic black iron oxide pigment.

4.3.2 Test Methods D 1509 is used to determine heating loss in carbon black pigment.

4.4 Aluminum and Zinc Pigments:

4.4.1 Test Methods D 480 include the determination of nonvolatile matter in aluminum paste.

4.4.2 Test Methods D 280 are applicable to zinc dust (metallic zinc powder).

4.5 Blue Pigments:

4.5.1 Test Methods D 280 are applicable to copper phthalocyanine blue and ultramarine blue pigments.

4.5.2 Test Methods D 1135 include the determination of moisture in iron blue pigments by the Brabender moisture tester and by toluene distillation.

4.6 *Green Pigments*—Test Methods D 280 are applicable to pure chrome green, chrome oxide green, and phthalocyanine green pigments.

4.7 Yellow, Orange, Brown Pigments:

4.7.1 Test Methods D 280 are applicable to zinc yellow (zinc chromate), strontium chromate, chrome yellow, chrome orange, cuprous oxide, natural red and brown iron oxide,