



## Standard Specification for Micaceous Iron Oxide Pigments for Paint<sup>1</sup>

This standard is issued under the fixed designation D 5532; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification covers the requirements and methods of test for lamellar iron oxide pigments, commonly called micaceous iron oxide, used primarily in protective coatings for steel. This standard is related to ISO 10601 and Australian Standard 2855- covering both specifications and methods of test. A companion test method for lamellar (thin film) content is included. This specification covers two types of micaceous iron oxide.

1.2 The following hazard caveat pertains only to the test method portion, Section 9, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 50 Test Methods for Chemical Analysis of Yellow, Orange, Red, and Brown Pigments Containing Iron and Manganese<sup>2</sup>

D 280 Test Methods for Hygroscopic Moisture (and Other Matter Volatile Under the Test Conditions) in Pigments<sup>2</sup>

D 1030 Test Method for Fiber Analysis of Paper and Paper-board<sup>3</sup>

D 1208 Test Methods for Common Properties of Certain Pigments<sup>2</sup>

#### 2.2 Other Standards:

ISO-10601 Micaceous Iron Oxide Pigments for Paints—Specifications and Methods of Test<sup>4</sup>

2855-1986, Paint and Related Materials—Micaceous Iron Oxide Pigment<sup>5</sup>

#### 2.3 ASTM Adjuncts:

<sup>1</sup> 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 Specifications.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 06.03.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 15.09.

<sup>4</sup> Available from International Organization for Standardization, Case Postale 56, 11211 Geneve 20, Switzerland.

<sup>5</sup> Available from Australian Standards Institute, 80 Arthur St., North Sydney, N.S.W., Australia.

Three photographs of two grades of micaceous iron oxide pigment<sup>6</sup>

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *lamellar particles*—thin flat particles.

3.1.2 *micaceous, lamellar*—similar to the structure of mica.

3.1.3 *micaceous or lamellar iron oxide (MIO)*— a refined mineral ore (also known as specular haemetite) or a manufactured product, consisting of iron (III) oxide (Fe<sub>2</sub>O<sub>3</sub>). It is grey in color with a metallic sheen and a lamellar form.

### 4. Significance and Use

4.1 The primary use of lamellar iron oxide is in protective coatings for steel and for optimum performance the pigment should have a high content of thin, flake-like particles. The protective action is ascribed to close packing of the pigment platelets within the paint film forming overlapping layers that lie roughly parallel to the substrate. This impedes penetration of corrosion stimulants, reduces ultraviolet degradation of the binder, improves film strength, reduces polymer swelling, and minimizes blistering. For less critical requirements, micaceous iron oxide with lower content of thin flakes may be acceptable. Therefore in this specification, micaceous iron oxide pigments are classified into two groups according to their thin flake content as determined by microscopic examination (see Section 9). When the proportion of lamellar particles is <50 %, the pigment is not to be classified as “lamellar” nor “micaceous”. Information on MIO lamellarity and performance is detailed in JOCCA 64, JOCCA 66, March 1983, and JOCCA 66, June 1983.<sup>7,8,9</sup>

4.2 Micaceous iron oxide pigments can vary in composition, particle size range, and particle shape depending upon whether they are produced synthetically or, if a refined natural oxide, the location where the ore was mined. The lamellar ore is readily fractured into thin platelets. These thin platelets of hematite (Fe<sub>2</sub>O<sub>3</sub>) are structurally similar to mica, hence the term “micaceous”. A hard granular form of the crystal also

<sup>6</sup> Three photographs of two grades of micaceous iron oxide pigment are available at nominal cost from ASTM Headquarters. Order Adjunct ADJD5532.

<sup>7</sup> D.M. Bishop, “Micaceous Iron Oxide Pigments,” *Journal of Oil and Colour Chemist’s Association (JOCCA)*, Vol 64, February 1981.

<sup>8</sup> D.M. Bishop and F.G.R. Zobel, “Micaceous Iron Oxide Paints,” *JOCCA*, Vol 66, March 1983.

<sup>9</sup> S. Wiktorek and J. John, “Micaceous Iron Oxide in Protective Coatings,” *JOCCA*, Vol 66, June 1983.