



Designation: E 156 - 88

AMERICAN SOCIETY FOR TESTING AND MATERIALS  
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## Standard Test Method for Determination of Phosphorus in High-Phosphorus Brazing Alloys (Photometric Method)<sup>1</sup>

This standard is issued under the fixed designation E 156; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 This test method covers the determination of phosphorus in alloys having chemical compositions within the following limits:

	Element Concentration Range, %
Copper	80 and over
Silver	0 to 15
Phosphorus	4 to 8

1.2 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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.* Specific hazard statements are given in Section 5.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>2</sup>
- E 50 Practices for Apparatus, Reagents, and Safety Precautions for Chemical Analysis of Metals<sup>3</sup>
- E 60 Practice for Photometric and Spectrophotometric Methods for Chemical Analysis of Metals<sup>3</sup>

### 3. Significance and Use

3.1 This test method for the chemical analysis of metals and alloys is primarily intended to test such materials for compliance with compositional specifications. It is assumed that all who use this test method will be trained analysts capable of performing common laboratory procedures skillfully and safely. It is expected that work will be performed in a properly equipped laboratory.

### 4. Photometric Practice, Apparatus, and Reagents

4.1 *Photometers and Photometric Practice*—Photometers and photometric practice prescribed in this method shall conform to Practice E 60.

4.2 Apparatus other than photometers, standard solutions, and certain other reagents used in more than one

procedure are referred to by number and shall conform to the requirements prescribed in Practices E 50.

### 5. Hazards

5.1 For precautions to be observed in the use of certain reagents in this test method, reference shall be made to Practices E 50.

### 6. Sampling

6.1 The sample shall be selected so as to be representative of the material to be analyzed.

### 7. Rounding Calculated Values

7.1 Calculated values shall be rounded to the desired number of places in accordance with the rounding method given in Rounding-off Procedure Section of Practice E 29.

### PHOSPHORUS BY THE VANADATE-MOLYBDATE (PHOTOMETRIC) METHOD

### 8. Summary of Test Method

8.1 A yellow-colored complex is formed when an excess of molybdate solution is added to an acidified mixture of a vanadate and an ortho-phosphate. Photometric measurement is made at approximately 470 nm.

### 9. Concentration Range

9.1 The recommended concentration range is from 0.15 to 3.0 mg of phosphorus in 100 mL of solution using a cell path of 2 cm.<sup>4</sup>

### 10. Stability of Color

10.1 The color of the phosphorus complex develops within 5 min and is stable for at least 1 h.

### 11. Interfering Elements

11.1 The elements ordinarily present in high-phosphorus brazing alloys do not interfere. Tin interferes with the phosphorus determination by the formation of insoluble stannic phosphate.

### 12. Reagents

12.1 *Ammonium Molybdate Solution* (100 g/L)—Dissolve 100 g of  $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$  in 600 mL of water at 50°C and dilute to 1 L. Filter before using.

12.2 *Ammonium Vanadate Solution* (2.5 g/L)—Dissolve

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee E-3 on Chemical Analysis of Metals and is the direct responsibility of Subcommittee E 03.05 on Nonferrous Metals.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 03.05.

<sup>4</sup> This procedure has been written for a cell having a 2-cm light path. Cells having other dimensions may be used, provided suitable adjustments can be made in the amounts of sample and reagents used.