



Designation: F364 – 96 (Reapproved 2014)

# Standard Specification for Molybdenum Flattened Wire for Electron Tubes<sup>1</sup>

This standard is issued under the fixed designation F364; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers two types of molybdenum flattened wire up to 0.050 in. (1.27 mm) thick and up to 0.375 in. (9.52 mm) wide, specifically for use in electron tubes. The two grades have UNS numbers R03604 and R03603.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The following safety hazards caveat pertains only to the test method described in this specification (see 10.2). *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*:<sup>2</sup>

**E18** Test Methods for Rockwell Hardness of Metallic Materials

**E315** Test Methods for Chemical Analysis of Molybdenum (Withdrawn 2010)<sup>3</sup>

**E384** Test Method for Knoop and Vickers Hardness of Materials

## 3. Classification

3.1 Two types of molybdenum flattened wire are covered by this specification:

3.1.1 *Type I, UNS R03604*—This type shall have the composition limits prescribed in **Table 1**.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F01 on Electronics and is the direct responsibility of Subcommittee F01.03 on Metallic Materials.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

3.1.2 *Type II, UNS R03603*—This type shall be a high-recrystallization-temperature material having the composition limits prescribed in **Table 1** and shall be capable of retaining its ductility after firing at a temperature of  $2375 \pm 25^\circ\text{F}$  ( $1300 \pm 14^\circ\text{C}$ ) for at least 20 min.

## 4. Ordering Information

4.1 Orders for material under this specification shall include the following information:

4.1.1 Quantity of each size,

4.1.2 Dimensions or size (see 8.1),

4.1.3 Edgewise curvature (camber) if required (see 8.2),

4.1.4 Type (see 3.1),

4.1.5 Temper (see 7.1), and

4.1.6 How furnished (coils, spools, etc.).

## 5. Materials and Manufacture

5.1 The molybdenum wires covered by this specification shall be made by any appropriate process.

NOTE 1—It has been found that molybdenum wire made by the powder metallurgy process will meet the requirements of this specification.

## 6. Chemical Composition

6.1 Type I and Type II molybdenum wire shall conform to the chemical compositions prescribed in **Table 1**.

6.2 The materials shall be analyzed in accordance with Test Methods **E315** or other appropriate ASTM methods when available. Other methods, as mutually agreed upon between seller and purchaser, may be employed.

## 7. Physical Properties

7.1 *Temper*—Material under this specification shall be supplied in one of the following classifications of temper:

7.1.1 *Hard*—As-rolled, not stress-relieved, suitable for spring applications, or

7.1.2 *Stress-Relieved*— Suitable for bending or winding.

7.2 The hardness test (see 10.1) is to be used as the criterion for identifying hard and stress-relieved materials in accordance with **Table 2**.

7.2.1 When determining microhardness using light loads, the thickness and load relationships shown in **Table 3** are recommended for best correlation and reproducibility.