



Designation: F 364 – 96 (Reapproved 2002)

Standard Specification for Molybdenum Flattened Wire for Electron Tubes ¹

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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 the standard. The values given in parentheses are for information only.

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:

- E 18 Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials ²
- E 315 Test Methods for Chemical Analysis of Molybdenum ³
- E 384 Test Method for Microhardness of Materials ²

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.

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.

¹ 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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² *Annual Book of ASTM Standards*, Vol 03.01.

³ *Annual Book of ASTM Standards*, Vol 03.01.

TABLE 1 Chemical Composition

| Element | Composition, max, ppm | |
|----------------------|-----------------------|-----------------------|
| | Type I UNS R03604 | Type II UNS R03603 |
| Carbon | 50 | 15 |
| Oxygen | 80 | 175 |
| Nitrogen | 20 | 10 |
| Hydrogen | 10 | 10 |
| Aluminum | 150 | 150 |
| Calcium | 50 | 50 |
| Silicon | 100 | 350 |
| Iron | 100 | 100 |
| Tungsten | 200 | 200 |
| Potassium | 150 | 150 |
| Tin | 25 | 25 |
| Other elements, each | 50 | 50 |
| | min % by difference | |
| Molybdenum | 99.90 | 99.90 |

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 E 315 or other appropriate ASTM methods when available. Other methods, as mutually agreed upon between seller and purchaser, may be employed.