



SURFACE VEHICLE STANDARD

J466™

JAN2018

Issued 1940-01
Reaffirmed 1989-12
Stabilized 2018-01

Superseding J466 DEC1989

Magnesium Wrought Alloys

RATIONALE

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1. **Scope**—This SAE Standard covers the most common magnesium alloys used in wrought forms, and lists chemical composition and minimum mechanical properties for the various forms. A general indication of the usage of the various materials is also provided.
- 1.1 **Introduction**—Magnesium wrought alloys are produced and fabricated by all the common production methods such as rolling, extrusion, and forging. Forms available are sheet, plate, wire, rod, bar, shapes, tubes, forgings, and impact extrusions. Magnesium alloys can be formed by bending, drawing, spinning, and pressing. The work is generally done hot except for simple operations. When done hot, magnesium alloys have exceptional workability. The temperature used varies from 300–750°F (149–399°C), depending on operation, alloy, and condition. All of the wrought alloys can be joined by adhesive bonding, spot welding, riveting, and bolting. Most of them are readily fusion welded and some do not require stress relief after welding. As with the cast alloys, all wrought alloys machine readily.

The temper designations used for wrought magnesium are similar to those used for aluminum alloys. Temper designations are covered by ASTM B 296-67 (1972), Recommended Practice for Temper Designations of Magnesium Alloys, Cast and Wrought. Mechanical properties are obtained by standard ASTM procedures. The tensile and compressive yield strength is taken at an offset of 0.2% from the initial modulus line.

Table 1 lists similar ASTM, AMS, Military, and Federal specifications covering the SAE wrought alloys in this SAE Standard.

TABLE 1—SIMILAR SPECIFICATIONS OF MAGNESIUM WROUGHT ALLOYS

Alloy Designation			Form	ASTM	AMS	Military or Federal
UNS	ASTM and SAE	Old SAE				
M11311	AZ31B	510	Sheet and plate Bar, rod, shapes Tube Forgings	B90 B107 B107 B91	4375, 4376, 4377 — — —	QQ-M-44 QQ-M-31 WW-T-825 QQ-M-40
M11610	AZ61A	520	Bar, rod, shapes Tube Wire (welding rod) Forgings	B107 B107 — B91	4350 4350 — 4358 ⁽¹⁾	QQ-M-31 WW-T-825 Mil-R-6944 QQ-M-40
M11800	AZ80A	523	Bar, rod, shapes Forgings	B107 B91	— 4360 ⁽¹⁾	QQ-M-31 QQ-M-40
M14141	LA141A		Sheet and plate	B90	—	—
M13310	HK31A	507	Sheet and plate	B90	4384, 4385	Mil-M-26075
M13210	HM21A		Sheet and plate Forgings	B90 —	4383, 4390 4363	Mil-M-8917 QQ-M-40
M13312	HM31A		Bar, rod, shapes	—	4388, 4389	Mil-M-8916
M15100	M1A	522	Bar, rod, shapes Forgings	B107 —	— —	QQ-M-31 QQ-M-40
M16100	ZE10A	534	Sheet and plate	B90	—	Mil-M-46037
M16400	ZK40A		Bar, rod, shapes	B107	—	—
M16600	ZK60A	524	Bar, rod, shapes Tube Forgings	B107 B107 B91	4352 4352 4362	QQ-M-31 WW-T-825 QQ-M-40

1. Noncurrent specifications.

2. References

2.1 Applicable Publications—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

2.1.1 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

ASTM B 90-70—Specification for Magnesium-Alloy Sheet and Plate

ASTM B 107-70—Specification for Magnesium-Alloy Extruded Bars, Rods, Shapes, Tubes, and Wire

ASTM B 296—Recommended Practice for Temper Designations of Magnesium Alloys, Cast and Wrought