



SURFACE VEHICLE INFORMATION REPORT

J451™

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Aluminum Alloys - Fundamentals

RATIONALE

The technical report covers technology, products, or processes which are mature and not likely to change in the foreseeable future.

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1. **Scope**

- 1.1 Purpose**—This information report is intended to give general data on the properties of aluminum and information on working, joining, forming, machining, finishing, and heat treating of aluminum.

2. **References**

- 2.1 Applicable Publication**—The following publication forms a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J454 AUG87—General Data on Wrought Aluminum Alloys

- 3. Properties**—Commercially pure aluminum is a face-centered cubic metal with a specific gravity of about 2.71 (0.098 lb/in³), a thermal conductivity of about 0.52 cgs units (at 25°C), and a melting point of approximately 1215 °F. Its coefficient of thermal expansion (approximately 0.000013 per °F) is about twice that of steel or cast iron and about one-third greater than that of copper or brass. The electrical conductivity of pure aluminum is about 62% of the International Annealed Copper Standard. In the form of cast test bars, the commercially pure metal has a typical tensile strength of 14 000 psi and a typical elongation of 30% in 2 in, while sheet in the annealed temper has a typical tensile strength of about 13 000 psi and a typical elongation of about 45% in 2 in. The modulus of elasticity, for all practical purposes, is 10 000 000 psi. The commercially pure metal and many of its alloys are highly resistant to atmospheric corrosion and to attack by many chemicals, with the notable exception of strong alkalis. Because it is so high in the electrochemical series, however, it is subject to galvanic attack if coupled with metals such as the copper alloys in the presence of an electrolyte.