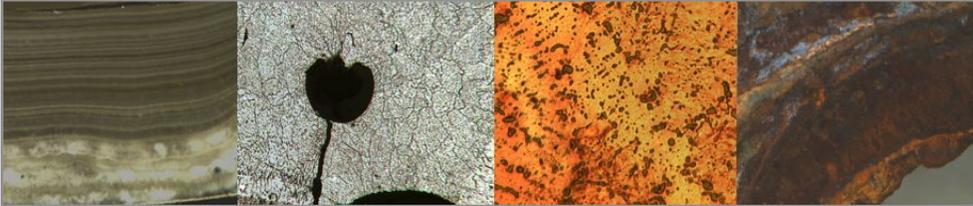


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WROUGHT ALUMINUM ALLOYS

JUNE 2015 SUPPLEMENT

Welcome to New Hampshire Materials Laboratory

Aluminum is one of the most common metals on earth. Did you know that it is the 3rd most plentiful element known to man? It is unique in being extremely economical to recycle and there is a healthy secondary metal industry that is working on better techniques to improve the use of these recycled aluminum products.

This article covers the interesting characteristics of different classifications for both wrought aluminum alloys and cast aluminum alloys.

For more information or to find out more on how we can be “Your Problem Solving Partner”, please visit our website at www.nhml.com or call our toll free number 800-334-5432.

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Wrought Aluminum Alloys

By: Timothy Kenney

Wrought aluminum alloys are commonly designated by a four digit number such as 6061, or in the UNS system of identification by the letter A and a five digit number beginning with “9”, such as A96061 for the same alloy. The numbering of alloys is determined by the primary alloying elements that are present as noted below.

<u>Numerical Designation</u>	<u>Example</u>	<u>Alloying Element(s)</u>
1XXX	1100	Unalloyed*
2XXX	2024	Copper
3XXX	3003	Manganese
4XXX	4032	Silicon
5XXX	5052	Magnesium
6XXX	6061	Magnesium and Silicon
7XXX	7075	Zinc

*The aluminum content is 99.00% or greater with the last two digits designating the amount in excess of 99%. For example 1060 aluminum contains a minimum of 99.60% aluminum.

Alloy Characteristics

1XXX

Aluminums of 99.00% purity or greater generally have excellent corrosion resistance and high electrical and thermal conductivity. The mechanical properties of this family are low, although they can be increased by cold working.

Typical uses for this alloy are chemical handling equipment and architectural trim. This is because of its superior corrosion resistance, or heat exchangers and electrical conductors because of its good conductivity.

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2XXX

This family of alloys requires a solution heat treatment to achieve optimum mechanical properties. A subsequent precipitation treatment is also commonly performed. The corrosion resistance of alloys in this family is generally poorer than other aluminum alloys but their strength can exceed that of low carbon steel.

Typical applications for this alloy are structural, where a good strength to weight ratio is required. Wheels and truck suspensions are also common applications.

3XXX

This family of alloys is not heat treatable, but may be hardened by cold working. These alloys have good formability and weldability with moderate strength. The 3000 series aluminums are used in highway signs, cooking ware, eating utensils and siding.

4XXX

The high solubility of silicon (up to 12%) results in a significant lowering of the melting point without subsequent brittleness. Accordingly, this family is commonly used as a brazing alloy. This family of alloys is not generally heat treatable and the high wear resistance of high silicon alloys is sometimes used.

5XXX

Like the 3000 series aluminum alloys, this group is not heat treatable, but has a moderate to high strength and responds to cold working. This family is readily weldable, and its good corrosion resistance makes it common in marine applications.

6XXX

This is the most familiar family of the alloys. This family is heat treatable and has moderate strength, formability, weldability and corrosion resistance. Structural applications are the most common use for this alloy family.

7XXX

The alloys in this family are heat treatable to relatively high strengths. The corrosion resistance of the family is good to poor and particularly is susceptible to stress corrosion cracking. Weldability is fair to poor. Common applications for this alloy family includes transportation equipment and airframes.

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Cast Aluminum Alloys

Cast aluminum alloys follow a similar pattern with a three digit designation followed by a decimal digit such as 356.0. In the UNS system of identification, by the letter A and a five digit number beginning with "0" such as A03560 for the same alloy. The first digit in the numbering of alloys is determined by the primary alloying elements that are present as noted below. The second and third digits alloying elements that are present as noted below. The second and third digits have no significance except for identifying various alloys within the group. The digit to the right of the decimal indicates the product form (0 for castings, 1 for ingot, and 2 for a narrower composition).

<u>Numerical Designation</u>	<u>Example</u>	<u>Alloying Element(s)</u>
1xx.x	150.1	Unalloyed*
2xx.x	201.0	Copper
3xx.x	355.0	Silicon, w/Cu and/or Mg
4xx.x	413.0	Silicon
5xx.x	514.0	Magnesium
6xx.x	-	Unused series
7xx.x	713.0	Zinc
8xx.x	850.0	Tim

*Aluminum content at least 99.00%.

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