

Alloys

Aluminum Alloys

Principal Alloying Element	Designation
>99% pure Aluminum (Al)	1xxx
Copper (Cu)	2xxx
Manganese (Mn)	3xxx
Silicon (Si)	4xxx
Magnesium (Mg)	5xxxx
Magnesium and Silicon (Mg and Si)	6xxx
Zinc (Zn)	7xxx
Other	8xxx

Aluminum Alloy

Most Often Used in Hardcoat Anodizing

Most aluminum alloys can be hardcoat anodized; this bulletin describes the more commonly used alloys.

Please note that the oxide thicknesses mentioned below are 50-percent buildup and 50-percent penetration.

In other words, a 0.002" anodic oxide will build up only 0.001" per side and not 0.002" as in plating and similar coatings.

While oxides may vary from a few tenths of an inch to 0.008" depending on engineering requirements, the standard oxide thickness is 0.002".

1xxx Series – Only 1100 is generally used. Bronze grey in color at 0.002"; alloy is soft and not particularly good for machining. Maximum practical oxide thickness 0.0025"; 0.003" is possible.

2xxx Series – Most common: 2014, 2017, 2024, 2618 (forgings). Avoid sharp corners, particularly on 2011-2017. Grey-black at 0.002" to blue-grey at 0.004" to 0.005". Excellent machining characteristic. Maximum practical oxide is 0.004", 0.006" possible for salvage, although not as hard as less heavy oxides.

3xxx Series – Most common: 3003. Grey-black in color at 0.002". Good for dye work and machining. Maximum oxide thickness is 0.002".

4xxx Series – Not commonly used.

5xxx Series – Most common: 5005, 5052, 5055 best for dye work; 5052 not good for dye work, except black. Both have good machining characteristics. Maximum practical oxide thickness is 0.004". Alloy 5052 has excellent dielectric when anodic oxide is 0.004".

6xxx Series – Most common: 6061, 6063. Almost black at 0.002", 6061 forms excellent hardcoat for grinding, lapping, honing. Excellent dimensional stability, though a little "stringy" to machine. All 6xxx alloys are used for extrusions (6061 can be sheet or extruded product). Maximum practical anodic oxide 0.0025", with 0.003" possible.

7xxx Series – Most common: 7075. Dark olive brown color. Forms an excellent hardcoat for grinding, lapping, honing. Excellent dimensional stability.