







Aluminum Hardeners

Aluminum's mechanical and physical properties are enhanced with the use of alloying elements. These alloying elements are commonly referred to as hardeners. Aluminum based master alloys which contain the hardener elements in high concentrations, provide a convenient and economical way to add them to aluminum to achieve desired properties. These master alloys readily go into solution at lower liquid aluminum temperatures, thus minimizing dross formation and solubility of hydrogen. Lower furnace temperatures also mean reduced energy consumption and longer furnace life.

Zirconium is a minor addition to certain aluminum-magnesium-zinc alloys such as 7005, in which it may reduce stress corrosion susceptibility. Zirconium additions in the range 0.1 to 0.3% are used to form a fine precipitate of intermetallic particles that inhibit recovery and recrystallization. An increasing number of alloys, particularly in the aluminum-zinc-magnesium family, use zirconium additions to increase the recrystallization temperature and to control the grain structure in wrought products. Zirconium additions leave this family of alloys less quench sensitive than similar chromium additions. Higher levels of zirconium are employed in some superplastic alloys to retain the required fine substructure during elevated-temperature forming. Zirconium additions have been used to reduce the as-cast grain size, but its effect is less than that of titanium. In addition, zirconium tends to reduce the grain-refining effect of titanium plus boron additions so that it is necessary to use more titanium and boron to grain refine zirconium-containing alloys.

Aluminum Zirconium

Alloy		Composition Limits Maximum unless shown as a range						Aluminum Association Color Coding	Form
6%Zr	H2606	Zr	5.5-6.5	Si	0.2	Others Each	0.03	 1 Dark Blue	Waffle Ingot
				Fe	0.25	Total	0.1		
				Ti	0.05				
10%Zr	H2600	Zr	9.0-11.0	Si	0.2	Others Each	0.03	 1 Dark Blue	Waffle Ingot
				Fe	0.25	Total	.15		
				Ti	0.05				
10%Zr	H2612	Zr	9.0-11.0	Si	0.30	Others Each	0.05	 1 Dark Blue	Waffle Ingot
				Fe	0.25	Total	0.1		
				Cu	0.20				
				Ni	0.20				
				Ti	0.20				
				Sn	0.20				
15%Zr	H2615	Zr	13.5-16.0	Si	0.35	Others Each	0.05	 1 Dark Blue	Waffle Ingot
				Fe	0.35	Total	0.1		