



Tempers

All aluminum alloys, regardless of product form, are classified as either heat-treatable or nonheat-treatable, depending upon the method used to attain their maximum strength.

- **Nonheat-treatable alloys:** 1000, 3000, and 5000 series develop strength characteristics through cold work after extruding, if the section shape permits.
- **Heat-treatable alloys:** 2000, 6000, and 7000 series, which have the highest strength of all aluminum alloys, attain their maximum strength through controlled heat treatment, sometimes at the extrusion press and sometimes in a separate furnace.

The modification methods applied to heat- and nonheat-treatable alloys are listed in the Temper Designation System below:

F	As Extruded	No special control over thermal conditions or strain-hardening; no mechanical property limits
O	Annealed	Thermally treated to obtain the lowest strength temper
H	Strain-hardened	Cold working used to increase strength and hardness
T	Thermally Treated	Thermally treated to produce stable tempers other than F, O, or H

A complete alloy-temper designation reads like this: 6063-T5. This designation indicates a particular alloy of the 6000 series (Mg and Si), which is thermally treated by being cooled from an elevated temperature and artificially aged.

Typical Tempers for Extrusions

- O Fully annealed
- H112 Strain-hardened; used for nonheat-treatable alloys
- T1 Cooled from an elevated temperature and naturally aged
- T4 Solution heat-treated and naturally aged
- T5 Cooled from an elevated temperature and artificially aged
- T6 Solution heat-treated (which may be accomplished for some alloys in-line at the extrusion press) and artificially aged