Common Aluminum Heat Treatment Tempers

Temper	Thermal Processing
T4	Solution treat and age naturally to a substantially stable condition. Natural aging may continue slowly, particularly at elevated service temperatures, so structural stability may not be satisfactory.
T6	Solution treat and age artificially. In castings, T6 commonly describes optimum strength and ductility
T61	Solution treat, quench and age artificially for maximum hardness and strength. This variant of T6 yields additional strength and stability but at reduced ductility.
T7	Solution treat, quench and artificially overage or stabilize. This temper improves ductility, thermal stability and resistance to stress corrosion cracking.
T71	Solution treat, quench and artificially overage to substantially stable condition. This temper further increases thermal stability and resistance to stress corrosion cracking and reduces strength.
T5	Age only. Stress relief or stabilization treatment. Cool from casting temperature and artificially age or stabilize (without prior solution treatment). Frequently, the as-cast condition provides acceptable mechanical properties but is accompanied by micro-structural instability or undesirable residual stresses. Perhaps the possibility of in-service growth is the only constraint against using a casting in the as-cast state. In each case, the T5 temper is appropriate.
Annealing	Castings that have low strength requirements but require high dimensional stability are annealed. Annealing also substantially reduces residual stress, a need in die castings. Annealing is a severe stabilization treatment and an elevated temperature variant of the T5 temper. Softening occurs because annealing depletes the matrix of solutes, and the precipitates formed are too large to provide hardening.