Aluminum

Although a variety of aluminum alloys made from primary or recycled metal can be die cast, most designers select standard alloys listed below:

Chemical Composition Charts

		Aluminum Die Casting Alloys			
Detailed Composition		360	380	384	413
Silicon	(Si)	9.0-10.0	7.5-9.5	10.5-12	11.0-13.0
Iron	(Fe)	2.0	2.0	1.3	2.0
Copper	(Cu)	0.6	3.0-4.0	3.0-4.5	1.0
Magnesium	(Mg)	0.4-0.6	0.10	0.10	0.10
Manganese	(Mn)	0.35	0.50	0.50	0.35
Nickel	(Ni)	0.50	0.50	0.50	0.50
Zinc	(Zn)	0.50	3.0	3.0	0.50
Tin	(Sn)	0.15	0.35	0.35	0.15
Total Others		0.25	0.50	0.50	0.25
Aluminum	(Al)	Balance	Balance	Balance	Balance

* Single value indicates maximum
** All values are percentage by weight

Typical Material Properties

	Aluminum Die Casting Alloys			
Mechanical Properties	360	380	384	413
Ultimate Tensile Strength ksi (MPa)	44 (303)	46 (317)	48 (330)	43 (300)
Yield Strength ksi (MPa)	25 (170)	23 (160)	24 (165)	21 (140)
Elongation % in 2in. (51mm)	2.5	3.5	2.5	2.5
Hardness BHN	75	80	85	80
Shear Strength ksi (MPa)	28 (190)	28 (190)	29(200)	25 (170)
Impact Strength ft-lb	-	-	3 (4)	-
Fatigue Strength ksi (MPa)	20 (140)	20 (140)	20 (140)	19 (130)
Young's Modulus psi x 10 6(GPa)	10.3 (71)	10.3 (71)	-	10.3 (71)
Physical Properties				
Density lb / in³(g/cm³)	0.095 (2.63)	0.099 (2.74)	0.102 (2.82)	0.096 (2.66)
Melting Range °F (°C)	1035-1105 (557-596)	1000-1100 (540-595)	960-1080 (516-582)	1065-1080 (574-582)
Specific Heat BTU / lb °F (J/kg °C)	0.23 (963)	0.23 (963)	0.23 (963)	0.23 (963)
Coefficient of Thermal Expansion				
µ in / in°F	11.6	12.2	11.6	11.3
µ m / m°K	(21.0)	(22.0)	(21.0)	(20.4)
Thermal Conductivity BTU / ft	65.3	55.6	55.6	70.1

hr°F (W / m °K)	(113)	(96.2)	(96.2)	(121)
Electrical Conductivity % IACS	30	27	22	31
Poisson’s Ration	0.33	0.33	-	-