Alloy Data: Aluminum Die Casting Alloy Properties

Table A-3-2 Typical Material Properties: Al Alloys

Typical values based on "as-cast" characteristics for separately die cast specimens, not specimens cut from production die castings.

	Aluminum Die Casting Alloys										
Commercial:	**360**	**A360**	**380**	**A380**	**383**	**384**	**390***	**13**	**A13**	**43**	**218**
ANSI/AA:	**360.0**	**A360.0**	**380.0**	**A380.0**	**383.0**	**384.0**	**B390.0**	**413.0**	**A413.0**	**C443.0**	**518.0**
Mechanical Properties											
Ultimate Tensile Strength											
ksi	44	46	46	47	45	48	46	43	42	33	45
(MPa)	(300)	(320)	(320)	(320)	(310)	(330)	(320)	(300)	(290)	(230)	(310)
Yield Strength Ⓐ											
ksi	25	24	23	23	22	24	36	21	19	14	28
(MPa)	(170)	(170)	(160)	(160)	(150)	(170)	(250)	(140)	(130)	(100)	(190)
Elongation											
% in 2 in. (51mm)	2.5	3.5	3.5	3.5	3.5	2.5	<1	2.5	3.5	9.0	5.0
Hardness Ⓑ											
BHN	75	75	80	80	75	85	120	80	80	65	80
Shear Strength											
ksi	28	26	28	27	—	29	—	25	25	19	29
(MPa)	(190)	(180)	(190)	(190)		(200)		(170)	(170)	(130)	(200)
Impact Strength											
ft-lb	—	—	3	—	3 Ⓓ	—	—	—	—	—	7
(J)			(4)		(4)						(9)
Fatigue Strength Ⓒ											
ksi	20	18	20	20	21	20	20	19	19	17	20
(MPa)	(140)	(120)	(140)	(140)	(145)	(140)	(140)	(130)	(130)	(120)	(140)
Young's Modulus											
psi x 10^6	10.3	10.3	10.3	10.3	10.3	—	11.8	10.3	—	10.3	—
(GPa)	(71)	(71)	(71)	(71)	(71)		(81.3)	(71)		(71)	
Physical Properties											
Density											
lb/in^3	0.095	0.095	0.099	0.098	0.099	0.102	0.098	0.096	0.096	0.097	0.093
(g/cm^3)	(2.63)	(2.63)	(2.74)	(2.71)	(2.74)	(2.82)	(2.73)	(2.66)	(2.66)	(2.69)	(2.57)
Melting Range											
°F	1035-1105	1035-1105	1000-1100	1000-1100	960-1080	960-1080	950-1200	1065-1080	1065-1080	1065-1170	995-1150
(°C)	(557-596)	(557-596)	(540-595)	(540-595)	(516-582)	(516-582)	(510-650)	(574-582)	(574-582)	(574-632)	(535-621)
Specific Heat											
BTU/lb °F	0.230	0.230	0.230	0.230	0.230	—	—	0.230	0.230	0.230	—
(J/kg °C)	(963)	(963)	(963)	(963)	(963)	—	—	(963)	(963)	(963)	—
Coefficient of Thermal Expansion											
µ in./in./°F	11.6	11.6	12.2	12.1	11.7	11.6	10.0	11.3	11.9	12.2	13.4
(µ m/m°K)	(21.0)	(21.0)	(22.0)	(21.8)	(21.1)	(21.0)	(18.0)	(20.4)	(21.6)	(22.0)	(24.1)
Thermal Conductivity											
BTU/ft hr °F	65.3	65.3	55.6	55.6	55.6	55.6	77.4	70.1	70.1	82.2	55.6
(W/m °K)	(113)	(113)	(96.2)	(96.2)	(96.2)	(96.2)	(134)	(121)	(121)	(142)	(96.2)
Electrical Conductivity											
% IACS	30	29	27	23	23	22	27	31	31	37	24
Poisson's Ratio	0.33	0.33	0.33	0.33	0.33	—	—	—	—	0.33	—

Ⓐ 0.2% offset. Ⓑ 500 kg load, 10mm ball. Ⓒ Rotary Bend 5 x 10^8 cycles Ⓓ Notched Charpy. Sources: ASTM B85-92a; ASM; SAE; Wabash Alloys.

** Two other aluminum alloys, 361 & 369, are being utilized in limited applications where vibration and wear are of concern. Contact your alloy producer for more information.*

More info can be obtained from Microstructure and Properties of Aluminum Die Casting Alloys Book, NADCA Publication # 215