Alloy Data

Table A-3-14 Typical Material Properties: Zn and ZA Alloys

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

	Zamak Die Casting Alloys				ZA Die Casting Alloys		
Commercial:	No. 2	No. 3 AG-40A	No. 5 AG-41A	No. 7 AG-40B	ZA-8	ZA-12	ZA-27
Mechanical Properties							
Ultimate Tensile Strength							
As-Cast ksi (MPa)	52 (359)	41 (283)	48 (328)	41 (283)	54 (372)	59 (400)	62 (426)
Aged ksi (MPa)	48 (331)	35 (241)	39 (269)	41 (283)	43 (297)	45 (310)	52 (359)
Yield Strength Ⓐ							
As-Cast ksi (MPa)	41 (283)	32 (221)	39 (269)	32 (221)	41-43 (283-296)	45-48 (310-331)	52-55 (359-379)
Aged ksi (MPa)					32 (224)	35 (245)	46 (322)
Compressive Yield Strength Ⓑ							
As-Cast ksi (MPa)	93 (641)	60 (414) Ⓒ	87 (600) Ⓒ	60 (414) Ⓒ	37 (252)	39 (269)	52 (358)
Aged ksi (MPa)	93 (641)	60 (414)	87 (600)	60 (414)	25 (172)	27 (186)	37 (255)
Elongation							
As-Cast % in 2 in. (51mm)	7	10	7	13	6-10	4-7	2.0-3.5
Aged % in 2 in. (51mm)	2	16	13	18	20	10	3
Hardness Ⓓ							
As-Cast BHN	100	82	91	80	100-106	95-105	116-122
Aged BHN	98	72	80	67	91	91	100
Shear Strength							
As-Cast ksi (MPa)	46 (317)	31 (214)	38 (262)	31 (214)	40 (275)	43 (296)	47 (325)
Aged ksi (MPa)	46 (317)	31 (214)	38 (262)	31 (214)	33 (228)	33 (228)	37 (255)
Impact Strength							
As-Cast ft-lb	35	43 Ⓔ	48 Ⓔ	43 Ⓔ	24-35 Ⓔ	15-27 Ⓔ	7-12 Ⓔ
(J)	(47.5)	(58)	(65)	(58)	(32-48)	(20-37)	(9-16)
Aged ft-lb	5	41	40	41	13	14	3.5
Fatigue Strength Ⓕ							
As-Cast ksi (MPa)	8.5 (58.6)	6.9 (47.6)	8.2 (56.5)	6.9 (47.6)	15 (103)	—	21 (145)
Aged ksi (MPa)	8.5 (58.6)	6.9 (47.6)	8.2 (56.5)	6.8 (46.9)	15 (103)	—	21 (145)
Young's Modulus							
psi x 10^6	Ⓖ	Ⓖ	Ⓖ	Ⓖ	12.4	12	11.3
(GPa)					(85.5)	(83)	(77.9)
Physical Properties							
Density							
lb/in^3	0.24	0.24	0.24	0.24	0.227	0.218	0.181
(g/cm^3)	(6.6)	(6.6)	(6.6)	(6.6)	(6.3)	(6.03)	(5.000)
Melting Range							
°F	715-734	718-728	717-727	718-728	707-759	710-810	708-903
(°C)	(379-390)	(381-387)	(380-386)	(381-387)	(375-404)	(377-432)	(372-484)
Specific Heat							
BTU/lb °F	0.10	0.10	0.10	0.10	0.104	0.107	0.125
(J/kg °C)	(419)	(419)	(419)	(419)	(435)	(450)	(525)
Coefficient of Thermal Expansion							
µ in/in°F	15.4	15.2	15.2	15.2	12.9	13.4	14.4
(µ m/m°K)	(27.8)	(27.4)	(27.4)	(27.4)	(23.2)	(24.1)	(26.0)
Thermal Conductivity							
BTU/ft hr°F	60.5	65.3	62.9	65.3	66.3	67.1	72.5
(W/m °K)	(104.7)	(113)	(109)	(113)	(115)	(116)	(122.5)
Electrical Conductivity							
µ Ω in.	25.0	27.0	26.0	27.0	27.7	28.3	29.7
Poisson's Ratio	0.30	0.30	0.30	0.30	0.30	0.30	0.30

Ⓐ *0.2% offset, strain rate sensitive, values obtained at a strain rate of 0.125/min (12.5% per minute).* Ⓑ *0.1% offset.* Ⓒ *Compressive strength.* Ⓓ *500 kg load, 10 mm ball.* Ⓔ *ASTM 23 unnotched 0.25 in. die cast bar.* Ⓕ *Rotary Bend 5 x 10^8 cycles.* Ⓖ *Varies with stress level; applicable only for short-duration loads. Use 10^7 as a first approximation. Source: International Lead Zinc Research Organization.*