ZINC ALLOY PROPERTIES

Alloy	#3	#5	#7	#2	ZA-8			ZA-12			ZA-27		
Mechanical Properties	Die Cast	Die Cast	Die Cast	Die Cast	Sand Cast	Perm Mold	Die Cast	Sand Cast	Perm Mold	Die Cast	Sand Cast	Sand Cast HT[1]	Die Cast
Ultimate Tensile Strength: psi x 10^3 (MPa)	41 (283)	48 (328)	41 (283)	52 (359)	38 (263)	32-37 (221-255)	54 (374)	40-46 (276-317)	45-50 (310-345)	58 (400)	58-64 (400-441)	45-47 (310-324)	61 (421)
Yield Strength - 0.2% Offset: psi x 10^3 (MPa)	32 (221)	33 (228)	32 (221)	-	29 (200)	30 (206)	42 (290)	31 (214)	39 (269)	46 (317)	54 (372)	37 (255)	55 (379)
Elongation: % in 2"	10	7	13	7	1-2	1-2	6-10	1-3	1-3	4-7	3-6	8-11	1-3
Shear Strength: psi x 10^3 (MPa)	31 (214)	38 (262)	31 (214)	46 (317)	-	35 (241)	40 (275)	37 (255)	-	43 (296)	42 (290)	33 (228)	47 (325)
Hardness: Brinell	82	91	80	100	85	85-90	95-110	89-105	89-105	95-115	110-120	90-110	105-125
Impact Strength: ft-lb (J)	43[2] (58)	48[2] (65)	43[2] (58)	35[2] (48)	15[6] (20)	-	31[3] (42)	19[3] (25)	-	21[3] (29)	35[3] (47)	43[3] (58)	9[3] (5)
Fatigue Strength Rotary Bend - 5x10^8 cycles psi x 10^3 (MPa)	6.9 (48)	8.2 (57)	6.8 (47)	8.5 (59)	-	7.5 (52)	15 (103)	15 (103)	-	17 (117)	25 (172)	15 (103)	21 (145)
Compressive Yield Strength - 0.1% Offset: psi x 10^3 (MPa)	60[4] (414)	87[4] (600)	60[4] (414)	93[4] (641)	29 (199)	31 (214)	37 (252)	33(227)	34 (234)	39 (269)	48 (331)	37 (255)	52 (385)
Modulus of Elasticity - psi x 10^6 (MPa x 10^3)	12.4[6](85.5)	12.4[6] (85.5)	12.4[6] (85.5)	12.4[6] (85.5)	12.4 (85.5)	12.4[7] (85.5)			12.0[7] (82.7)			11.3[7] (77.9)	
Physical Properties													
Density: lb/cu in (g/cm^3)	.24 (6.6)	.24 (6.6)	.24 (6.6)	.24 (6.6)		0.227 (6.3)			0.218 (6.0)			0.181 (5.0)	
Melting Range: °F (°C)	718-728 (381-387)	717-727 (380-386)	718-728 (381-387)	715-734 (379-390)		707-759 (375-404)			710-810 (377-432)			708-903 (376-484)	
Electrical Conductivity: % IACS	27	26	27	25		27.7			28.3			29.7	
Thermal Conductivity: BTU/ft/hr/°F (W/m/hr/°C)	65.3 (113.0)	62.9 (108.9)	65.3 (113.0)	60.5 (104.7)		66.3 (114.7)			67.1 (116.1)			72.5 (125.5)	
Coefficient of Thermal Expansion 68-212°F µin/in/°F (100-200°C µm/mm/ °C)	15.2 (27.4)	15.2 (27.4)	15.2 (27.4)	15.4 (27.8)		12.9 (23.3)			13.4 (24.2)			14.4 (26.0)	
Specific Heat: BTU/lb/ °F (J/kg/ °C)	.10 (419)	.10 (419)	.10 (419)	.10 (419)		.104 (435)			.107 (448)			.125 (534)	
Pattern or Die Shrinkage: in/in	.007	.007	.007	.007		1/8 in/ft .007		1/8 in/ft	5/32 in/ft	.0075	5/32 in/ft	5/32 in/ft	.008
Chemical Specifications (per ASTM) (% by weight)	Ingot / Casting	Ingot / Casting	Ingot / Casting	Ingot / Casting	Ingot	Casting		Ingot	Casting		Ingot	Casting	
Al	3.9-4.3 / 3.5-4.3	3.9-4.3 / 3.5-4.3	3.9-4.3 / 3.5-4.3	3.9-4.3 / 3.5-4.3		8.2-8.8	8.0-8.8		10.8-11.5	10.5-11.5		25.5-28.0	25.0-28.0
Mg	.025-.05 / .020-.05	.03-.06 / .03-.08	.01-.020 / .005-.020	.025-.05 / .020-.050		.020-.030	.015-.030		.020-.030	.015-.030		.012-.020	.010-.020
Cu	.10 max / .25 max[9]	.75-1.25 / .75-1.25	.10 max / .25 max	2.6-2.9 / 2.5-3.0		0.8-1.3	.8-1.3		0.5-1.2	0.5-1.2		2.0-2.5	2.0-2.5
Fe (max)	.075 / .10	.075 / .10	.075 / .075	.075 / .10		.065	.075		.065	.075		.072	.075
Pb (max)	.004 / .005	.004 / .005	.0020 / .003	.004 / .005		.005	.006		.005	.006		.005	.006
Cd (max)	.003 / .004	.003 / .004	.0020 / .002	. 003 / .004		.005	.006		.005	.006		.005	.006
Sn (max)	.002 / .003	.002 / .003	.0010 / .001	.002 / .003		.002	.003		.002	.003		.002	.003
Ni (other)[10]	- / -	- / -	.005-.020 / .005-.020	-		-			-			-	
Zn	Balance / Balance	Balance / Balance	Balance / Balance	Balance / Balance		Balance	Balance		Balance	Balance		Balance	Balance
Industry Standards	Ingot / Casting	Ingot / Casting	Ingot[5] / Casting	Ingot / Casting		Ingot	Casting		Ingot			Ingot	Casting
ASTM	B240 AG40A / B86 AG40A	B240 AC41A / B86 AC41A	B240 AG40B / B86 AG40B	B240 AC43A / B86 AC43A		B669 (B240)[8] B791 (B86)[8]			B669 (240)[8]	B79 (B86)[8]		B669 (B240)[8]	B86 (B791)[8]
SAE	J468B 903 / J468B 903	J468B 925 / J468B 925		Former 921									
UNS	Z33521 / Z33520	Z35530 / Z35531	Z33522 / Z33523	Z35540 / Z35541		Z35635	Z35636 -		Z35630	Z35631		Z35840	Z35841

[1] 3 hr at 610° F and furance cool. [2] 1/4" square specimen unnotched [3] 10 mm square specimen unnotched [4] Comprehensive strengh [5] Previous industry accepted standard. [6] Estimated values to be confirmed by research.

[7] Values for permanent mold condition which should be similar for other processes except for ZA-27 Sand Cast Heat Treat (HT).

[8] Revision of standard anticipated 1998.

[9] Per ASTM B86-88, * For the majority of commercial applications, a copper content in the range of 0.25 to 0.75% will not adversely affect the serviceability of die castings and should not serve as a basis for rejection.*

[10] Zamak alloy ingot for die casting (with the exception of % Ni in No.7) may contain Ni, Cr, Mn, Si, in amounts of up to 0.02, 0.02, 0.06 and 0.035% respectively.

ZA Ingot for foundry and pressure die casting may contain Ni, Cr, or Mn in amounts of up to 0.01% each or 0.03% total.

INTERZINC