Chicago White Metal Casting, Inc.

ISO 9001:2000 Quality
ISO 14001:2004 Environmental
Registered Systems

EXCELLENCE IS EXPECTED
Certified Aluminum, Magnesium & Zinc Die Castings

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Typical Material Properties

Typical alloy values based on "as-cast" characteristics for separately die cast specimens, not specimens cut from production die castings.
(Ref: 2012 NADCA Standards. Sec. 3)

Mechanical Properties

Commercial:	Al 380	Mg AZ91D	Zn 3	ZA-8
Ultimate Tensile				
ksi	47	34 [2]	41	54
(MPa)	(324)	(230)	(283)	(372)
Yield Strength				
ksi	23 [5]	23 [5][2]	32 [7]	41-43
(MPa)	(160)	(160)	(221)	(283-296)
Elongation				
% in 2 in. (51 mm)	3.5	3 [2]	10	6-10
Hardness				
BHN	80 [8]	75 [6]	82	100-106
Shear Strength				
ksi	27	20 [2]	31	40
(MPa)	(190)	(140)	(214)	(275)
Impact Strength				
ft-lb	--	1.6 [4]	43 [4]	24-35 [4]
(J)	--	(2.2)	(58)	(32-48)
Fatigue Strength				
ksi	20 [1]	10 [9]	6.9 [1]	15
(MPa)	(140)	(70)	(47.6)	(103)
Young's Modulus				
psi x 10^6	10.3	6.5 [2]	Varies	12.4
(GPa)	(71)	(45)		(85.5)

Physical Properties				
Commercial:	**Al 380**	**Mg AZ91D**	**Zn 3**	**ZA-8**
Density				
lb/in3	0.098	0.066	0.24	0.227
(g/cm3)	(2.71)	(1.81)	(6.6)	(6.3)
Melting Range				
°F	1000-1100	875-1105	718-728	707-759
(°C)	(540-595)	(470-595)	(381-387)	(375-404)
Specific Heat				
BTU/lb°F	0.23	0.25 ❷	0.1	0.104
(J/kg°C)	(963)	(1050)	(419)	(435)
Coefficient of Thermal Expansion				
µ in./in./°F x 10^{-6}	12.1	13.8 ❷	15.2	12.9
(µ m/m°K)	(21.8)	(25)	(27.4)	(23.2)
Thermal Conductivity				
BTU/ft hr °F	55.6	41.8 ❸	65.3	66.3
(W/m°K)	(96.2)	(72)	(113)	(115)
Electrical Conductivity				
% IACS	23	n/a	27	27.7
Electrical Resistivity				
µ Ω in.	n/a	35.8 ❷	n/a	n/a
(µ Ω cm)		(14.1)		

❶ Rotary bend 5 x 10^{8} cycles
❷ At 68°F (20°C)
❸ At 212-572°F (100-300°C)
❹ ASTM E 23 unnotched 0.25 in. die cast bar
❺ 0.2% offset
❻ Average hardness based on scattered data.
❼ 0.2% offset, strain rate sensitive, values obtained at a strain rate of 0.125/min (12.5% per min.)
❽ 500 kg load, 10mm ball
❾ Rotating Beam fatigue test according to DIN 50113. Stress corresponding to a lifetime of 5 x 107 cycles. Higher values have been reported. These are conservative values.