

AUSTEMPERED DUCTILE IRON

ASTM A897-06 (in-lb units) TYPICAL PROPERTIES*	110-70-11 GRADE 750	130-90-9 GRADE 1	150-110-7 GRADE 2	175-125-04 GRADE 3	200-155-2 GRADE 4	230-185-1 GRADE 5
MONOTONIC (STATIC) PROPERTIES						
TENSILE STRENGTH (ksi)	114	140	165	190	220	240
0.2% OFFSET YIELD STRENGTH (ksi)	75	110	130	160	180	210
ELONGATION (% IN 2 INCH GAGE LENGTH)	14	11	10	7	5	3
HARDNESS BRINELL BHN (B.I.D. mm)	270 (3.70)	302 (3.50)	340 (3.30)	387 (3.10)	418 (3.00)	460 (2.85)
REDUCTION IN AREA (%)	15	10	9	6	4	2
**YOUNG'S MODULUS (MSI)	24.8	23.1	22.9	22.7	22.5	22.3
COMPRESSIVE STRENGTH (ksi)		200	240	280	330	365
SHEAR STRENGTH (ksi)		125	150	170	200	215
MODULUS OF RIGIDITY (MSI)		9.44	9.28	9.16	9.04	9.00
POISSON'S RATIO	0.297	0.25	0.25	0.25	0.25	0.25
***STRENGTH COEFFICIENT K (ksi)		218				
***STRAIN HARDENING EXPONENT n		0.143				
***TRUE FRACTURE STRENGTH σ_f		150				
***TRUE FRACTURE DUCTILITY ϵ_f		0.082				
DYNAMIC PROPERTIES						
FATIGUE STRENGTH (@10 MILLION CYCLES):						
-ROTATING BENDING AS MACHINED (ksi)	56	65	70	60		
-REVERSE BENDING AS MACHINED (ksi)			60	55		
- AXIAL PUSH-PULL			55			
-G-50 MAX. ALLOWABLE CONTACT STRESS (ksi)	145	165	180	195	220	250
-G-50 SINGLE TOOTH BENDING AS MACHINED (ksi)	47	50	52	50	48	46
-G-50 SINGLE TOOTH BENDING AS SHOT PEENED (ksi)	94	100	110	100	95	90
-UN-NOTCHED CHARPY IMPACT@ 70°F (ft-lb)	98	90	90	70	60	40
-NOTCHED CHARPY IMPACT @ 70°F (ft-lb)	11	9	8	7	6.5	6
DYNAMIC ELASTIC MODULUS (MSI)		24.7	24.4	24.2	23.9	23.7
EST. DUCTILE/BRITTLE TRANSITION TEMP. (F)		-2	-2	-2	-2	-2
FRACTURE TOUGHNESS (MPa*SQRT(m))	100	100	78	55	48	40
**STRENGTH COEFFICIENT K' (ksi)		223				
**STRAIN HARDENING EXPONENT n'		0.1330	0.1376	0.1465	0.1600	
**FATIGUE STRENGTH COEFFICIENT s'_f (ksi)		211	394	450	728	
**FATIGUE STRENGTH EXPONENT b		-0.1110	-0.1460	-0.1600	-0.2050	
**FATIGUE DUCTILITY COEFFICIENT e'_f		0.1990	0.1780	0.3960	0.4880	
**FATIGUE DUCTILITY EXPONENT C		-0.6770	-0.6280	-0.7520	-0.8480	
PHYSICAL (INTRINSIC) PROPERTIES						
DENSITY (lb/cubic in)	0.26	0.2562	0.2558	0.2555	0.2552	0.2548
COEFF. OF THERMAL EXPANSION (in/in/F) X 10 ⁻⁶	7.5	8.1	8.0	7.8	7.7	7.5
WEAR RESISTANCE (AMAX PIN TEST,VOLUME LOSS cu. mm)	15	10.9	10.8	10.6	10.3	9.8
LINEAR EXPANSION - % (from Ferritic/from Pearlitic)	0.09/0.015	0.12/0.02	0.18/0.08	0.25/0.13	0.27/0.16	0.28/0.17
THERMAL CONDUCTIVITY (BTU-in/h-sq.ft-F)	145	153	151	149	147	145
INTERNAL DAMPING (log decr.) X .0001		5.26	5.41	5.69	12.7	19.2

*These numbers are not guaranteed minimums. They represent typical properties that one may observe in commercial ADI components.

** Young's modulus data courtesy of Daimler-Chrysler

*** Grade 130-90-9 fatigue coeff. & exponents courtesy of Daimler-Chrysler. All other grades courtesy of John Dec

