AUSTEMPERED DUCTILE IRON

ASTM A897/897M-16 (in-lb units) TYPICAL PROPERTIES*	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)	130	150	175	200	230
0.2% OFFSET YIELD STRENGTH (ksi)	90	110	125	155	185
ELONGATION (% IN 2 INCH GAGE LENGTH)	9	7	4	2	1
HARDNESS BRINELL HBW (B.I.D. mm)	302 (3.50)	340 (3.30)	387 (3.10)	418 (3.00)	460 (2.85)
REDUCTION IN AREA (%)	10	9	6	4	2
**YOUNG'S MODULUS (MSI)	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	0.25	0.25	0.25	0.25	0.25
***STRENGTH COEFFICIENT K (ksi)	218				
***STRAIN HARDENING EXPONENT n	0.143				
***TRUE FRACTURE STRENGTH s_f	150				
***TRUE FRACTURE DUCTILITY e_f	0.082				
DYNAMIC PROPERTIES					
FATIGUE STRENGTH (@10 MILLION CYCLES):					
-ROTATING BENDING AS MACHINED (ksi)	65	70	60		
-REVERSE BENDING AS MACHINED (ksi)		60	55		
- AXIAL PUSH-PULL		55			
-G-50 MAX. ALLOWABLE CONTACT STRESS (ksi)	165	180	195	220	250
-G-50 SINGLE TOOTH BENDING AS MACHINED (ksi)	50	52	50	48	46
-G-50 SINGLE TOOTH BENDING AS SHOT PEENED (ksi)	100	110	100	95	90
-UN-NOTCHED CHARPY IMPACT@ 70°F (ft-lb)	90	90	70	60	40
-NOTCHED CHARPY IMPACT @ 70°F (ft-lb)	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 (KSI*SQRT(in))	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)	0.2562	0.2558	0.2555	0.2552	0.2548
COEFF. OF THERMAL EXPANSION (in/in/°F) X 10^{-6}	8.1	8.0	7.8	7.7	7.5
WEAR RESISTANCE (AMAX PIN TEST,VOLUME LOSS cu. mm)	10.9	10.8	10.6	10.3	9.8
LINEAR EXPANSION - % (from Ferritic/from Pearlitic)	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)	153	151	149	147	145
INTERNAL DAMPING (log decr.) X .0001	5.26	5.41	5.69	12.7	19.2

*UTS, YS and %EL are minimums - the remaining properties 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 coefficients & exponents courtesy of Daimler-Chrysler. All other grades courtesy of John Deere.

APPLIED PROCESS INC