AUSTEMPERED DUCTILE IRON

ASTM A897-06 (SI units) TYPICAL PROPERTIES*	750-500-11 GRADE 750	900-650-9 GRADE 1	1050-750-7 GRADE 2	1200-850-4 GRADE 3	1400-1100-2 GRADE 4	1600-1300-1 GRADE 5
MONOTONIC (STATIC) PROPERTIES						
TENSILE STRENGTH (MPa)	786	966	1139	1311	1518	1656
0.2% OFFSET YIELD STRENGTH (MPa)	515	759	897	1104	1242	1449
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 (GPa)	171	159.3	157.9	156.5	155.1	153.8
COMPRESSIVE STRENGTH (MPa)		1380	1650	1935	2275	2520
SHEAR STRENGTH (MPa)		870	1025	1180	1370	1490
MODULUS OF RIGIDITY (GPa)		65.1	64.0	63.2	62.4	62.1
POISSON'S RATIO	0.297	0.25	0.25	0.25	0.25	0.25
***STRENGTH COEFFICIENT K (MPa)	1138	1503				
***STRAIN HARDENING EXPONENT n	0.147	0.143				
***TRUE FRACTURE STRENGTH s_f		1032				
***TRUE FRACTURE DUCTILITY e_f		0.082				
DYNAMIC PROPERTIES						
FATIGUE STRENGTH (@10 MILLION CYCLES):						
-ROTATING BENDING AS MACHINED (MPa)	387	450	485	415		
-REVERSE BENDING AS MACHINED (MPa)			415	380		
- AXIAL PUSH-PULL			385			
-G-50 MAX. ALLOWABLE CONTACT STRESS (MPa)	1000	1155	1260	1365	1560	1750
-G-50 SINGLE TOOTH BENDING AS MACHINED (MPa)	325	350	365	350	335	320
-G-50 SINGLE TOOTH BENDING AS SHOT PEENED (MPa)	650	700	770	700	665	630
-UN-NOTCHED CHARPY IMPACT@ 21°C (JOULES)	130	120	120	93	80	53
-NOTCHED CHARPY IMPACT @ 21°C (JOULES)	14	12	10.6	9.3	8.6	8
DYNAMIC ELASTIC MODULUS (GPa)		170	168	167	165	164
EST. DUCTILE/BRITTLE TRANSITION TEMP. (C)		-20	-20	-20	-20	-20
FRACTURE TOUGHNESS (MPa*SQRT(m))	109	109	85	60	52	44
**STRENGTH COEFFICIENT K' (MPa)	1195	1538				
**STRAIN HARDENING EXPONENT n'	0.111	0.1330	0.1376	0.1465	0.1600	
**FATIGUE STRENGTH COEFFICIENT s_f' (Mpa)	1045	1455	2720	3100	5020	
**FATIGUE STRENGTH EXPONENT b	-0.068	-0.1110	-0.1460	-0.1600	-0.2050	
**FATIGUE DUCTILITY COEFFICIENT e_f'	0.2986	0.1990	0.1780	0.3960	0.4880	
**FATIGUE DUCTILITY EXPONENT C	-0.6121	-0.6770	-0.6280	-0.7520	-0.8480	
PHYSICAL (INTRINSIC) PROPERTIES						
DENSITY (g/cubic cm)	7.1	7.0965	7.0872	7.0779	7.0686	7.0593
COEFF. OF THERMAL EXPANSION (mm/mm/C) X 10^{-6}	13.5	14.6	14.3	14.0	13.8	13.5
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 (W/M-K)	21.0	22.1	21.8	21.5	21.2	20.9
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
*** Grades 750 and 900 fatigue coeff. & exponents courtesy of Daimler-Chrysler. All other grades courtesy of John Dee