



STEEL GRADES VERSUS IRON GRADES

STEEL GRADE & IRON GRADE	TENSILE STRENGTH (MIN) / (PSI)	YIELD STRENGTH (MIN) / (PSI)	ELONGATION ON % MIN.	HARDNESS BRINELL HB-RC	
				MIN.	MAX.
4340 Normalized STEEL (T 1600 F)	185 500	125 000	12.2	36 RC / 363 BHN	---
ADI IRON : I75-I25-4	175 000	125 000	4	341 BHN	444 BHN
4140 STEEL	862 MPa / 125 000	758 MPa / 110 000	14	28 RC / 271 BHN	36 RC / 336 BHN
4140 Normalized STEEL (T 1600 F)	148 000	95 000	17.7	302 BHN	---
ADI IRON : I50-I10-07	150 000	110 000	7	302 BHN	375 BHN
FORGED STEEL	115 000	75 000	10	262 BHN	---
ADI IRON : I50-I10-07	150 000	110 000	7	302 BHN	375 BHN
I045 STEEL	640 MPa / 93 000	410 MPa / 59 000	22	10 RC / 187 HB	---
DUCTILE IRON : I00-70-3	100 000	70 000	3	217 BHN	269 BHN
I030 Laminated STEEL	550 MPa / 80 000	330 MPa / 48 000	32	179 HB	---
DUCTILE IRON : 80-55-6	80 000	55 000	6	217 BHN	269 BHN
I022 Normalized STEEL	70 000	52 000	34	143 BHN	---
DUCTILE IRON : 65-45-12	65 000	45 000	12	156 BHN	217 BHN

FATIGUE DATA : Steel versus Iron

Relationship between the fatigue limit and the tensile strength S_u has been established for unnotched polished specimens tested using the rotating beam method. This method loads the specimens by reversed bending.

$$S'_e = 0,5 S_u \quad \text{for Wrought Steels where } S_u < 1400 \text{ MPa}$$

$$S'_e = 690 \text{ MPa} \quad \text{for Wrought Steels where } S_u > 1400 \text{ MPa}$$

$$S'_e = 0,4 S_u \quad \text{for cast steel and cast iron}$$

Ferrous metals can operated continuously without failure at stress levels at or below the stress limit S'_e .

Note : All of the above relationships are based on a 50 % survival life.

The fatigue limit for reversed axial load of a polished, unnotched specimen is about 15 % lower than that for reversed bending.

The fatigue limit for torsional testing of polished unnotched specimens is

- S'_{es} is about 0,58 x the fatigue limit in reversed bending for steel.
- S'_{es} is about 0,8 x the fatigue limit in reversed bending for cast iron.
- S'_{ns} is about 0,48 x the fatigue limit in reversed bending for copper.

http://www.roymech.co.uk/Useful_Tables/Fatigue/Fatigue.html