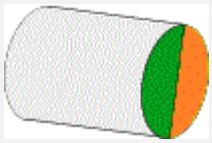
EN39B CASE HARDENING STEEL

EN39B is a 4 1/4% Nickel Chromium Molybdenum carburising steel, generally supplied annealed to HB 277 max. Carburised and heat treated it develops a hard wear resistant case of about Rc 6-63 and a tough strong core with a typical tensile strength range 1000-1400MPa, in small to quite large sections.

Colour Code	Stocked Sizes		
Green & Orange (Bar End) 	Rounds	50mm to 205 mm Diameter	

Related Specifications	
Australia	AS X9315 / EN39B
Germany	DIN: 15NiCrMo16-5
Great Britain	835M15 or 835H15
Japan	SNCM 815, JIS G 4103
USA	EN: 39B

Chemical Composition		
	Min. %	**Max. %**
Carbon	0.12	0.18
Silicon	0.10	0.35
Manganese	0.25	0.50
Nickel	3.90	4.30
Chromium	1.00	1.40
Molybdenum	0.15	0.3

Mechanical Test Requirements - If supplied to BS 970 - 1 - 1996 835M15

Test Bar Diameter	19mm
Tensile Strength	1310MPa
Elongation on 5.65 So	8%
Impact - Izod	34 J min

Check test certificate if critical for end use.

Typical Mechanical Properties - Quenched at 830°C and tempered at 200°C

Section Size mm	25	50	100
Tensile Strength	1350	1300	1180
Yield Strength Mpa	1150	1100	920
Elongation %	13	15	17
Impact Izod J	50	72	82
Hardness HB	400	380	350

Forging

Heat to 1150°C and hold until uniform. Minimum forging temperature 900°C. Cool in ashes, warm dry lime or sand.Note: Soaking time at forging temperature should be as short as possible to avoid heavy scaling and excessive grain growth.

Heat Treatment

Annealing

Heat to 830°C - 850°C, hold until temperature is uniform throughout the section and cool in furnace.

Normalising

Heat to 900°C - 930°C, Cool in still air

Temper at 640°C - 660°C Cool in still air

For optimum machinability

Stress Relieving

Heat to 600°C - 650°CCool in furnace to 450°C and air cool

Carburizing

Pack, salt or gas carburize at 900°C - 950°C, holding for sufficient time to develop the required case depth and carbon content, followed by a suitable hardening and tempering cycle to optimise case and core properties.

Refining & Hardening

Core Refine

Slow cool from carburizing temperature and re-heat to 850°C - 880°C, hold until temperature is uniform throughout the section, quench as required in water, oil or air cool. Alternatively quench in salt bath held at 150°C - 250°C, followed by air cool.

Case Hardening

Following core refining, re-heat to 760°C - 800°C, hold until temperature is uniform throughout the section, and quench in oil.Temper immediately while still hand warm.

Single Refine*

Direct Quench: Cool from carburizing temperature to 810 °C - 830 °C, hold until temperature is uniform throughout the section. Quench as required in water, oil or air cool. Alternatively quench in salt bath held at 150 °C - 250 °C, followed by air cool and temper immediately.
Or: Cool from carburizing temperature to room temperature, re-heat to 810 °C - 830 °C and hold until temperature is uniform throughout the section and quench or air cool as previous. Temper immediately.
Note: When air cooling large sections a uniform fan cooling is recommended, especially when direct cooling from carburizing temperature.
*Suitable for fine grained steels only.

Tempering

Heat to 150°C - 200°C as required, hold until temperature is uniform throughout the section, soak for 1 - 2 hours per 25 mm of section, and cool in still air.N.B.Tempering will improve the toughness of both case and core, with only a slight reduction in core strength and case hardness. It will also reduce the susceptibility of the case to grinding cracks.

Welding

EN39B is readily weldable in the annealed condition with correct procedure, but welding in the case hardened or through condition is not recommended.

Welding Procedure
Low hydrogen electrodes recommended. Pre-heat at 250°C - 350°C and maintain during welding. Cool slowly in ashes, warm dry lime or sand etc, followed when possible with a stress relieve.