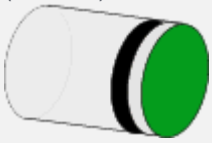
ENGINEERING STEELS + ALLOYS

EN26 HIGH TENSILE STEEL

EN26 is a 2.5% nickel - chromium - molybdenum high hardenability, high tensile steel, generally supplied hardened and tempered in the tensile range 1000 - 1150 Mpa (Condition V) Rc 31 - 38.Characterised by high strength and toughness in very large sections - similar to EN25 but with higher carbon content, particularly suitable where high surface pressure exists.
Pre hardened and tempered EN26 can be further surface hardened by flame or induction hardening, and by nitriding.
EN26 is used extensively in most industry sectors for applications requiring higher tensile and yield strength than 4140, 4340 or EN25 can provide.
Typical uses are: Axles, Connecting Rods, Die Holders, Hydraulic Shafts, Spindles, Motor Shafts, Pins, Rams, Rolls, Sockets, Tool Holders, Torsion Bars etc..

Colour Code	Stocked Sizes	
Dark Green & Black (Bar End) 	Round	24 mm to 450 mm Diameter
	Bar Finish	
	Peeled, Turned, Centreless Ground.	

Related Specifications

Australia	AS 1444-1996-X9940
Germany	W.Nr 1.6745 40NiMoCr10 4
Great Britain	BS970: PART 3: 1991 826M40 BS970: 1955 - EN26

Chemical Composition (Base Material)

	Min. %	Max %
Carbon	0.36	0.44
Silicon	0.10	0.40
Manganese	0.45	0.70
Nickel	2.30	2.80
Chromium	0.50	0.80
Molybdenum	0.45	0.66
Phosphorous	0	0.04
Sulphur	0	0.04

Mechanical Property Requirements for Steels in the Heat-Treated Condition for Black, Peeled, Turned or Ground Finish to AS1444-1996 X9940 and BS970 Part 3-1991 826M40

Mechanical Property Designation		U	U	*V	*V	W	W	X	Y	Z
Limited Ruling Section mm		250	150	250	150	250	150	150	150	100
Tensile Strength Mpa	Min	930	930	1000	1000	1080	1080	1150	1230	1550
	Max	1080	1080	1150	1150	1230	1230	1300	1380	
0.2% Proof Stress Mpa	Min	725	740	820	835	910	925	1005	1080	1125

Elongation on $5.65\sqrt{S_0}$ %	Min	12	12	12	12	11	11	10	10	7
Izod Impact J	Min	34	47	34	47	27	40	34	34	13
Charpy Impact J	Min	28	42	28	42	22	35	28	28	11
Hardness Brinell HB	Min	269	269	293	293	311	311	341	363	444
	Max	331	331	352	352	375	375	401	429	

*Material stocked generally in condition V.Check test certificate if critical for end use.

Forging

Heat to 1150 °C - 1200 °C maximum, hold until temperature is uniform throughout the section, and commence forging immediately.Do not forge below 850 °C.Following forging operation the work piece should be cooled as slowly as possible in sand or dry lime etc..

Heat Treatment

Annealing

Heat to 790 °C - 840 °C, hold until temperature is uniform throughout the section and cool in furnace.

Flame or Induction Hardening

EN26 hardened and tempered bar can be further surface hardened by either the flame or induction hardening methods resulting in a case hardness in excess of Rc 50.
Parts should be heated as quickly as possible to the austenitic temperature range (820 °C - 850 °C) and required case depth followed by an immediate oil or water quench, depending upon hardness required, workpiece size/shape and quenching arrangements.Following quenching to hand warm, most components should be tempered between 150 °C - 200 °C to remove quenching stresses in the case. This will have little effect on case hardness.

Hardening

Heat to 820 °C - 850 °C, hold until temperature is uniform throughout the section, soak for 10 - 15 minutes per 25 mm section, and quench in oil, water, or polymer as required.*Temper immediately while still hand warm.

Nitriding

EN26 hardened and tempered bar can also be successfully nitrided, giving a surface hardness of up to Rc 60. Nitriding is carried out at 490 °C - 530 °C, followed by slow cooling (no quench) reducing the problem of distortion. Parts can therefore be machined to near final size, leaving a grinding allowance only. The tensile strength of the core is usually not affected since the nitriding temperature range is generally below the original tempering temperature employed.N.B. Nickel is inert to the action of nitrogen and in general resists its diffusion into steel, and this can result in a lower case hardness or longer nitriding cycle times for steels containing nickel such as EN26.

Stress Relieving

Heat to 640 °C - 660 °C, hold until temperature is uniform throughout the section, soak for 1 hour per 25 mm section, and cool in still air.

Tempering

Re-heat to 450 °C - 660 °C as required, hold until temperature is uniform throughout the section, soak for 1 hour per 25 mm of section, and cool in still air.N.B.Tempering should be avoided if possible within the range 250 °C - 450 °C due to temper brittleness.

Notes on Heat Treatment

Heating temperatures, rate of heating, cooling and soaking times will vary due to factors such as work piece size/shape also furnace type employed, quenching medium and work piece transfer facilities etc..Please consult your heat treater for best results.

Machining

EN26 in the hardened and tempered as supplied condition is still regarded as being readily machinable and operations such as turning and drilling etc. can be carried out satisfactorily using machine manufacturers, recommendations for suitable tool type - feeds and speeds.

Welding

Welding of EN26 in the hardened and tempered condition (as normally supplied), is not recommended and should be avoided if at all possible, as the mechanical properties will be altered within the weld heat affected zone. It is preferred that welding be carried out on EN26 while in the annealed condition, and that the work piece, immediately on cooling to hand warm, is then stress relieved at 640 °C - 660 °C prior to hardening and tempering.If welding in the hardened and tempered condition is really necessary, then the work piece, immediately on cooling to hand warm, should be stress relieved at 15 °C below the original tempering temperature.

Welding Procedure						
Welding of EN26 in whatever condition should always be carried out using low hydrogen electrodes - please consult your welding consumables supplier.						
Suggested pre-heat temperature						
Section	25 mm	40 mm	50 mm	75 mm	150 mm	200 mm +
°C	370	400	425	455	510	550
Post Welding						
Maximum cooling rate 95 °C per hour down to 95 °C, follow by cooling in still air.N.B. No draught. It is recommended that the work piece if possible is wrapped in an heat resistant blanket or buried in sand etc..						