

## HIGH TENSILE STEEL to BS 970 – 1955 EN 25

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**EN 25 Nickel-Chrome-Moly High Tensile Steel**, generally supplied hardened and tempered to condition “U” in sections up to 250mm, with a tensile strength of 925-1075 MPa, it has excellent toughness and good wear resistance. Larger sections can be supplied aiming for this strength or as pre-arranged with supplier.

**Typical Applications:** Heavy-duty axles, connection rods, drill shanks, motor shafts, piston rods etc.

### Typical Chemical Analysis

Carbon	0.30%
Silicon	0.25%
Manganese	0.55%
Nickel	2.55%
Chromium	0.65%
Molybdenum	0.55%

### Related Specifications:

AS 1444-1996	X9931
BS 970-3-1991	826M31
Werkstoff 1.6743	32NiCrMo10-4

### Surface Treatment:

Will **Nitride** with a typical surface hardness up to **HRC 60**.

Will **Flame or Induction** harden with a typical surface hardness up to **HRC 50**.

### Mechanical Properties in Condition “U” - to BS 970-3-1991 826M31

Section mm	0.2% Proof Stress MPa	Tensile Strength MPa	Elongation on $5.65\sqrt{S_0}$ %	Impact		Hardness HB
				Izod J	KV J	
*Up to 100	755 min	925 – 1075	9 min	47 min	-	269 – 331
Up to 150	740 min	925 – 1075	12 min	47 min	42 min	269 – 331
150 to 250	725 min	925 – 1075	12 min	34 min	28 min	269 – 331

\*Applies only to bars bright drawn after hardening and tempering.

### Typical Mechanical Properties in Condition “U” – for section size listed

Section in mm	Yield Strength MPa	Tensile Strength MPa	Elongation %	Izod J	Hardness HB
50	900	1050	17	92	310
200	820	990	16	82	290

Typical mechanical properties for guidance only

**Welding:**

Readily welded in the annealed condition but avoid when possible if hardened and tempered due to the effect on the mechanical properties. Welding in the nitrided, flame or induction hardened condition is not recommended.

**HEAT TREATMENT:****Forging:**

Heat to 1150°C      Hold till uniform  
Minimum forging temperature 850°C  
Cool slowly in ashes or sand etc.

**Annealing:**

Heat to 800°C – 850°C  
Cool in furnace

**Stress Relieving:**

Annealed: Heat to 600°C – 650°C  
Hardened: Heat to 500°C – 550°C  
Cool in still air

**Hardening:**

Heat to 830°C – 850°C  
Quench in oil or polymer

**Tempering:**

Heat to 450°C – 660°C  
Cool in still air

**NB.** Tempering within the range 250°C – 450°C will result in temper brittleness and should be avoided.

**Welding procedure:**

Low hydrogen electrodes are recommended. Pre-heat at 200°C – 300°C and maintain during welding. Cool slowly in ashes or sand etc and stress relieve if this is possible.

Welding details for guidance only

**Flame or Induction Hardening:**

Heat quickly to the required case depth at 830°C – 850°C and quench immediately in water or oil.

Tempering at 150°C – 200°C will reduce stresses in the case with minimal effect on its hardness.

All de-carburised surface material must first be removed to ensure best results.

**Nitriding:**

Heat to 500°C – 530°C and hold for sufficient time to develop the depth of case required

Parts should be pre-hardened and tempered as required and also pre-machined leaving a small grinding allowance only.

Heat treatment details for guidance only.