

817M40 / EN24 Alloy Steel — Material Data Sheet

BS 970-1 (817M40) · nearest EN 10083-3 grade 34CrNiMo6 · BS 970 817M40 (EN24), near 4340

British nickel-chromium-molybdenum alloy steel, near equivalent of 4340

The British counterpart of 4340: a nickel-chromium-molybdenum steel supplied hardened and tempered to condition T (850 to 1000 MPa) and above — for drawings written to BS 970 or EN24.

TENSILE, CONDITION T	850–1000 MPa (123–145 ksi)	NICKEL	1.30–1.70 %
PROOF STRESS, CONDITION T	680 MPa (99 ksi) min, to 150 mm	NEAREST US GRADE	AISI 4340 (substitute on mechanical properties)
CARBON	0.36–0.44 %	MAGNETIC	Yes

Nominal composition

■ Fe balance ~ 95.8% ■ Ni ~ 1.50% ■ Cr ~ 1.20% ■ Mn ~ 0.57% ■ C, P, S, Si, Mo trace

Midpoints of the specification ranges, for orientation only. Limits are in the table.

Chemical composition — 817M40 (EN24)

Element	Symbol	Min %	Max %
Carbon	C	0.36	0.44
Manganese	Mn	0.45	0.70
Phosphorus	P	—	0.035
Sulfur	S	—	0.040
Silicon	Si	0.10	0.35
Nickel	Ni	1.30	1.70
Chromium	Cr	1.00	1.40
Molybdenum	Mo	0.20	0.35

Per BS 970 for 817M40, confirmed by UK stockholder datasheets (Hillfoot, Steel Express). The older EN24 ranges of BS 970:1955 were slightly wider.

Physical properties (typical)

DENSITY	0.284 lb/in ³ (7.85 g/cm ³)
MODULUS OF ELASTICITY	29.0 × 10 ⁶ psi (200 GPa)
THERMAL EXPANSION (20–300 °C)	12 µm/m·K (6.7 µin/in·°F)
MAGNETIC	Yes

Heat treatment

Harden from 830 to 850 °C (1525 to 1560 °F) and oil quench, then temper at up to 660 °C (1220 °F) to reach the condition required, avoiding 250 to 375 °C. Anneal at 840 to 860 °C and furnace cool; stress relieve at 650 to 670 °C; forge at 1000 to 1100 °C and not below 850 °C.

Mechanical properties — 817M40, BS 970 conditions

Condition (BS 970)	Tensile strength (MPa / ksi)	0.2 % proof stress, min (MPa / ksi)	Elongation, min (%)	Hardness (HB)
T	850–1000 (123–145)	680 (99) to 150 mm · 654 (95) 150–250 mm	13	248–302
U	925–1075 (134–156)	755 (110)	12	269–331
V	1000–1150 (145–167)	850 (123)	12	293–352

Conditions T, U and V confirmed by two UK stockholder datasheets (West Yorkshire Steel, Hillfoot); condition T proof stress also by Steel Express. Harder conditions W to Z are produced in smaller sections; ask our estimating team. The limiting ruling section for each condition depends on bar size.

Applicable standards

BS 970 PART 1	Wrought steels for mechanical and allied engineering (817M40)
BS EN 10083-3	Nearest European grade 34CrNiMo6 (1.6582)
ASTM A322 / A434	US equivalent 4340 bar and its quenched-and-tempered classes

Forms we supply in 817M40 (EN24)

- Machined components from certified bar
- Studs, threaded rod and U-bolts
- Hex bolts and cap screws
- Nuts, washers and spacers
- Pins, shafts and bushings

Typical applications

- Components to British and Commonwealth OEM drawings
- Shafts, gears and highly stressed machine parts
- High-strength studs and bolts
- Oilfield equipment built to UK specifications