

709M40 - 1% Cr - Mo Steel

Related Specifications

Also covers 708M40 - 1% Cr-Mo Steel
BS970 - 1955 EN19
DIN 42CrMo4
W.Nr. 1.7225
AISI 4140

709M40 is a 1% Cr-Mo medium hardenability general purpose high tensile steel. It is generally supplied in the Hardened and Tempered condition in the tensile range of 850 - 1000Mpa (T Condition) but can be heat treated to 700 - 1200Mpa dependent on section size (R - W Condition). This alloy is used in most industry sectors for a wide variety of applications. Typical uses include Drive shafts, couplings, bolts and gears, together with many surface and sub-surface components in the oil and gas industries. This grade also has reasonably good impact properties at low temperatures and can be good for some elevated temperature uses. 709M40 can be further surface hardened by either flame or induction hardening methods, giving case hardnesses in excess of 50 HRc.

Typical Chemical composition

Carbon	0.40%
Silicon	0.25%
Manganese	0.85%
Phosphorous	<0.040%
Sulphur	<0.040%
Chromium	1.00%

Mechanical Property Requirements - BS970 Part 3 1991

Condition	Ruling Section	Tensile Strength Mpa	Yield (0.2%) MpA	Elongation %	Izod FTLBS	Charpy J	Hardness HB
R	250mm	700/850	480	15	25	28	201/255
S	150mm	775/925	570	15	40	50	223/277
T	100mm	850/1000	665	13	40	50	248/302
U	63mm	925/1075	740	12	35	42	369/331
V	29mm	1000/1150	835	12	35	42	293/352
W	19mm	1075/1225	925	12	30	35	311/375

Forging

Forging Temperature for this material should be 850 - 1200oC
Soak times should be kept to a minimum to avoid heavy scaling, but sufficient time should be given to allow centre to achieve furnace temperature.
After forging pieces should be allowed to cool in still air.

Heat Treatment

Hardening - Heat to 840 - 875oC for a time commensurate with ruling section and quench in Oil, Water or Polymer.

Note: If water quench is to be used, although not recommended, care must be taken to ensure that all sharp corners are removed prior to heat treatment.

Tempering - Re-heat to 550 - 700oC as required, dependent on final required properties. Hold for a time commensurate with the ruling section and cool in still in air.

Machining

709M40 has good to very good machinability, dependent on condition, and operations such as sawing, turning, broaching, milling etc can be accomplished satisfactorily using standard machine tool manufacturers recommended speeds and feeds.

Welding

Welding of 709M40 in the hardened and tempered condition is not advised and should be avoided if possible. If welding is required it should be done using low hydrogen electrodes, while the material is in the annealed condition, and the work piece should be stress relieved (595 - 620oC) immediately after cooling to hand warm, prior to hardening and tempering.