

C	Si	Mn	Ni	Cr	Mo
0.35	0.25	0.55	1.55	1.55	0.25

Features and Uses

This 1.5% Nickel Chromium-Molybdenum Steel is supplied in the heat-treated condition of 850 / 1000 Mpa, thereby eliminating the need for heat treatment at a later stage. The benefits include no distortion and time delays due to heat treatment.

This heat-treated condition is ideal for many applications that require toughness and strength. The as-supplied heat treated condition equals about 248 / 302 Brinell Hardness or HRC 24 to HRC 32. It is classified as constructional steel.

Typical uses include high tensile bolts, studs, main shafts, gun barrels and breech mechanisms, high temperature bolts in steam plants, cams, engine connecting rods, small spindle gears, racks.

MCV can be annealed and heat treated to higher or lower tensile strengths for certain requirements, taken into account the limiting ruling section. See chart below.

Heat Treatment

Annealing

Pack anneal in a tube or other closed container with clean cast iron borings at 800° / 850°C for at least 2 to 3 hours. Cool at 10°C with the furnace until the temperature falls below 400°C. Withdraw from box or tube and allow to cool to shop temperature.

Stress Relieving

Where tools are heavily machined, ground or subjected to cold work, the relief of internal strains is essential before hardening. Stress relieving should be done after rough machining. To stress relieve, heat carefully to 650°C soak well and allow to cool slowly to room temperature.

Hardening

MCV can be oil quenched and tempered to a maximum surface hardness of about 48/52 HRC. As the diameter of the component increases, the core hardness of the material will drop off. To harden, soak thoroughly at 840 / 860 °C allowing 30 minutes per inch of ruling section before quenching.

Quenching Media

Oil produces the desired hardness as does salt quenching but with both media distortion should be allowed for in the design.

Case Hardening

This material is not ideally suited to case hardening as the core hardness is high and could result in the component snapping. However in certain instances it may be advantageous to case harden and a surface hardness of HRC 60 is attainable.

Tempering

Temper the tool for a minimum of 1 hour as soon as it reaches 50° / 70 °C usually between 500°C and 650°C according to the

requirements of the job. A protective atmosphere is required above 300°C

Nitriding and Tuftriding

Nitriding gives a very hard surface, which is resistant to wear and erosion. MCV can be Nitrided in the "as-supplied" condition and the core of this material will not soften below condition "T" during the Nitriding process. MCV does not Nitride as well as PMS owing to the Nickel content but is still very successful in many applications such as small gears requiring a hard case and tough core.

Tuftriding works well on MCV imparting anti seize, anti galling and corrosion resistance to the part. Once again, the tough core supports the tufride layer and there is no dimensional movement. Suitable for very fine tooth gears and spindles.

The limiting ruling section determines the maximum diameter that will through harden to a given hardness.

Diam in mm	Con- dition	Tensile Strength Mpa
250	T	850/1000
100	U	930/1080
64	V	1000/1160
30	X	1080/1240
29	Y	1160/1310
25	Z	1540 MIN