1.2601 Cold Work Tool Steel

Properties

Dimensionally stable, high carbon, high-chromium(12%) steel.

Particularly suitable for air hardening.

Good toughness.

Application

High-duty cutting tools (dies and punches), blanking and punching tools, woodworking tools, shear blades for cutting light-gauge material, thread tolling tools, tools for drawing, deep drawing and cold extrusion, pressing tools for the ceramics and pharmaceutical industries, cold rools (working rools) for multiple-roll stands, measuring instruments and gauges, small moulds for the plastic industry where excellent wear resistance is required.

Chemical composition

C	Si	Mn	Cr	Mo	V	W	P	S
1.55- 1.75	0.25- 0.40	0.20- 0.40	11.00- 12.00	0.50- 0.70	0.10- 0.50	0.40- 0.60	0.03 max	0.03 max

Hot forming

Forging:

1050 to 850℃

Slow cooling in furnace or thermoinsulating material

Heat treatment

Annealing:

800 to 850℃

Slow controlled cooling in furnace at a rate of 10 to 20℃/hr down to approx. 600℃, further cooling in air.

Hardness after annealing:

Max.250 HB

Stress relieving:

650 - 700℃

Slow cooling in furnace; intended to relieve stresses set up by extensive machining, or in complex shapes. After through heating, hold in reutral atmosphere for 1 to 2 hours.

Hardening:

980 to 1010℃

Oil, salt bath from (220 to 250℃ or 500 to 550℃), air, gas.

Tools of intricate shape or with sharp edges should preferably be hardened in air or salt bath. Holding time after temperature equalization: 15 to 30 minutes.

Obtainable hardness: 63 – 65 HRC.

Tempering:

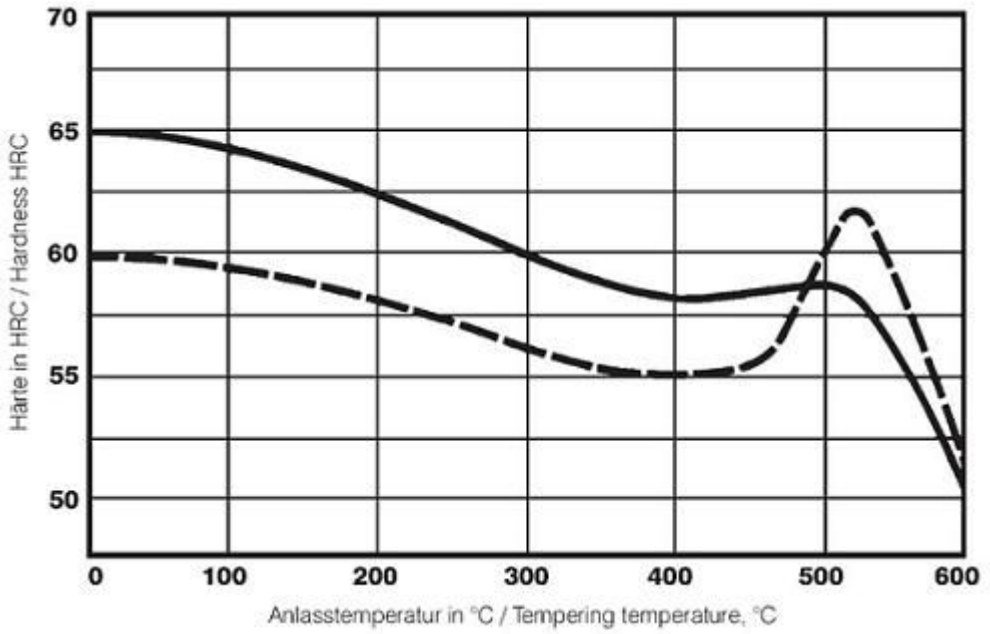
Slow heating to tempering temperature immediately after hardening / time in furnace 1 hour for each 20 mm of workpiece thickness but at least 2 hours / cooling in air.

For average hardness figures to be obtained please refer to tempering chart.

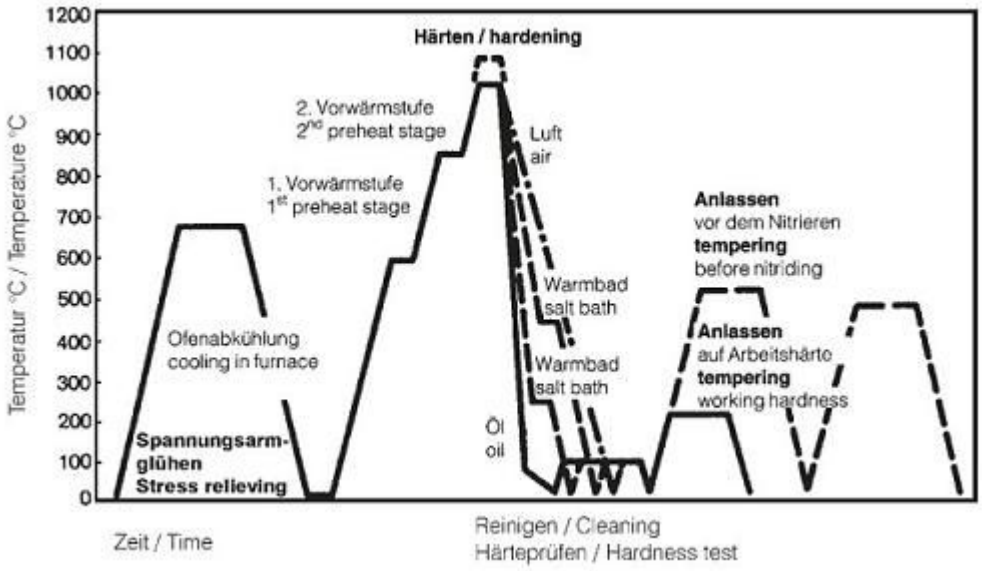
For certain cases we recommend to reduce tempering temperature and increase holding time.

For certain applications requiring improved retention of hardness, a nitriding treatment is recommended.

Tempering chart:



Heat treatment sequence:



Surface treatment

Nitriding:

From this treatment a minimum hardness of the base material of approx. 60 HRC will result.

If maximum dimensional stability is required, the tempering temperature should be at least equal to the subsequent nitriding temperature.

After nitriding, stress relieving at about 300℃ is recommended.

If salt bath nitriding is to be effected, we recommend elevated hardening temperature (1050 to 1080 ℃) with subsequent tempering in two cycles.

1st at 520℃.

2nd at 30-50℃ below 1st tempering temperature. Then bath nitriding, e.g. Tufftride process, is carried out at 570℃; holding time: 30 minutes for a depth of nitration of about 0.03 mm.

Repair welding:

There is a general tendency for tool steels to develop cracks after welding.

If welding cannot be avoided, the instructions of the appropriate welding electrode manufacturer should be sought and followed.