D3 Cold Work Tool Steel

Properties

Standard grade of dimensionally stable ledeburitic, high carbon, high chromium (12%) tool steels.

Application

Blanking, punching, shearing: Punches for high duty and complicated progressive and integral cutting dies, mainly for industries making electrical equipment, fit- tings, cardboard, preserve cans, and watches; saw teeth cutting dies, scraping and trimming tools for maximum production runs, highly stressed for all types of cutting tools, high performance shear blades for cutting sheet of up to 4 mm thickness, de- burring tools, and cutters for wire nail manufacture.

Machining: Broaches, cutters for steel wool production, high duty woodworking tools.

Shaping: Thread rolling dies, flanging and beading dies, punches and dies for cold nut manufacture; tools for spinning, pressing, deep drawing, and cold extrusion of light alloys and steel; master hobs for making plastic moulds, knurling tools, wire drawing dies, mandrels and dies for tube and rod drawing, mandrels for the cold pilger rolling of steel tubes, hammers and reducing dies for needle manufacture.

Wear resisting tools and components: Press tools for the processing of highly abrasive ceramic materials, liner plates for the brick industry and for making refractories, press tools for the pharmaceutical industry, automatic lathe guide sleeves, guide bars in centerless grinding machines, cone pulleys and rings for wire drawing machines, sand- blast nozzles, and tools for the powder metal industry.

Measuring tools

Hot work tools: High duty hammer cores for the manufactu- re of scythes and sickles, and for fast hitting hammers used to forge hard or high alloy steels; tyre mill finishing rolls, hot drawing rings etc.

Chemical composition:

C	Si	Mn	Cr	Mo	V	W
2.00 - 2.35	0.25 – 0.45	0.24 – 0.45	11.0 – 13.0	0.80	0.80	0.75

Standards

DIN 1.2080, BS BD3, JIS SKD1

Hot forming

Forging:

1050 to 850°C

Slow cooling in furnace or thermoinsulating material.

Heat treatment

Annealing:

800 to 850°C

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

Hardness after annealing: max. 248 HB.

Stress relieving:

approx. 650°C

Slow cooling in furnace; intended to relieve stresses set up by extensive machining, or in complex shapes.

After through heating, hold in neutral atmosphere for 1-2 hours.

Hardening:

940 to 970°C

Oil, salt bath (220 to 250°C or 500 to 550°C), compressed or still air if thickness does not exceed 25 mm and if hardening temperature is on the upper side of the range.

Holding time after temperature equalization: 15 to 30 minutes.

Obtainable hardness: 63 - 65 HRC.

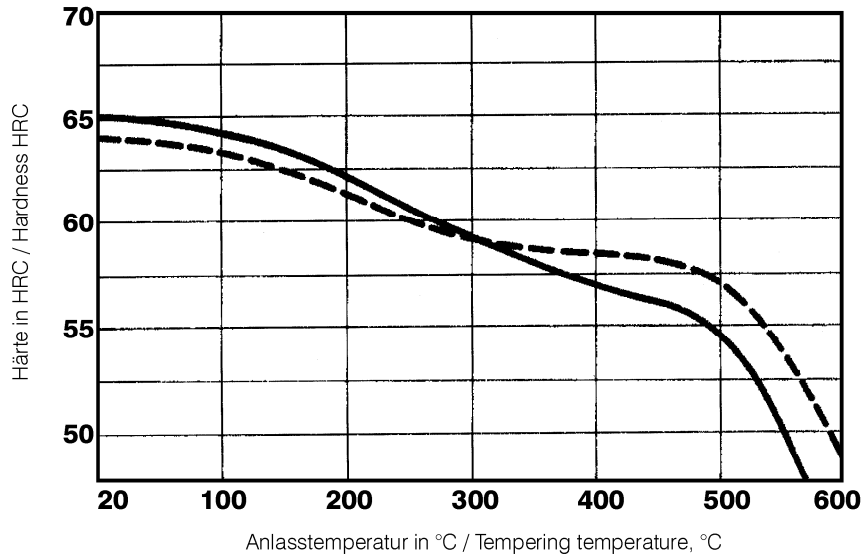
Tempering:

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.

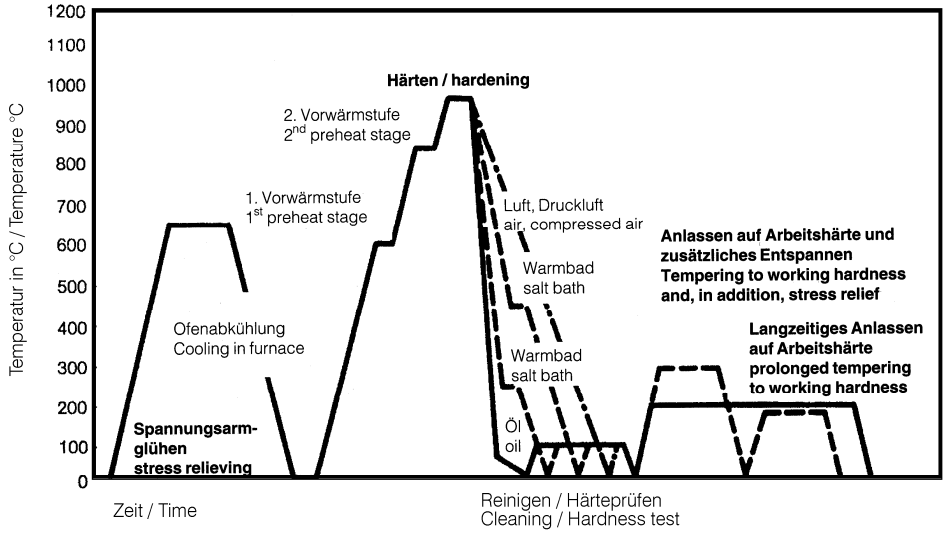
For average hardness figures to be obtained please refer to the tempering chart.

For certain cases we recommend to reduce tempering temperature and increase hol- ding time.

Tempering chart:



Heat treatment sequence:



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.