

H13 Tool Steel (X40CrMoV5-1)

High strength at elevated temperatures, high hot wear resistance, good toughness, thermal conductivity and resistant to hot cracking, limited water cooling possible.

Applications: Standard material for hot forming tools, extrusion tools, forging dies, pressure casting tools, hot shear knives, tools for plastic industry. Also available in EFS and ESR condition where better properties are required.

Colour Code  Yellow/Green/Blue	Stocked Sizes	
	Condition of Delivery	Soft annealed to max. 229 HB

Related Specifications

	Germany	DIN 1.2344
	USA	AISI H13

Chemical Composition

	%
Carbon	0.40
Chromium	5.30
Molybdenum	1.40
Vanadium	1.00

Physical Properties

Thermal expansion coefficient	$\left[\frac{10^{-6} \text{ m}}{\text{m K}} \right]$	20-100°C	20-300°C	20-500°C	20-700°C
		10,8	12,3	13,0	13,5
Thermal conductivity	$\left[\frac{\text{W}}{\text{m K}} \right]$	20°C	350°C	700°C	
		25,6	28,4	29,4	

Heat Treatment

Soft Annealing

Temperature	Cooling	Hardness
750 - 800°C	furnace	max 229 HB

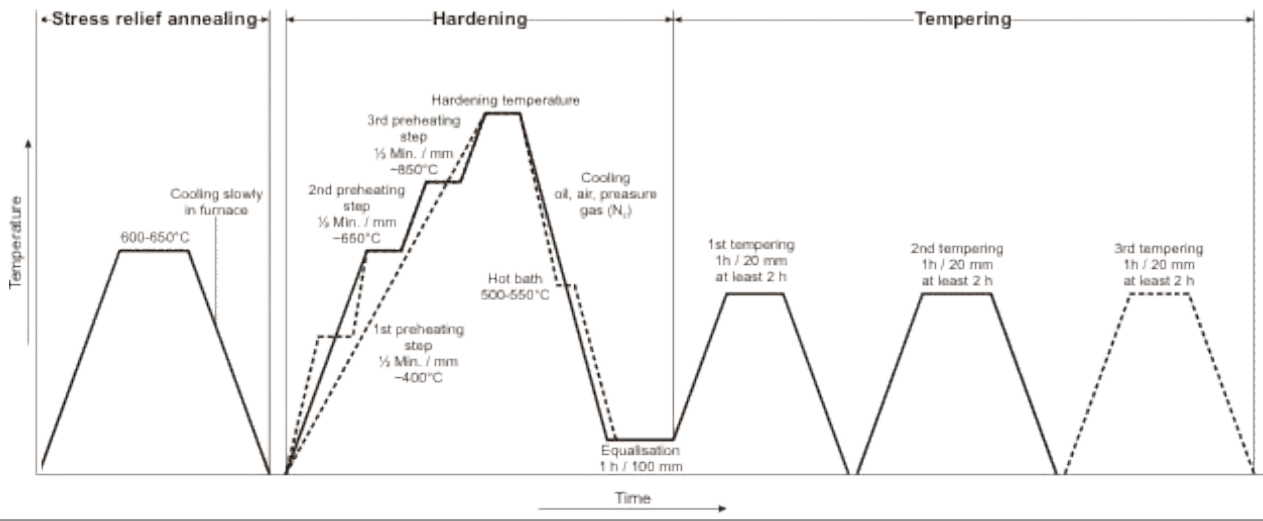
Stress Relief Annealing

Temperature	Cooling
600 - 650°C	furnace

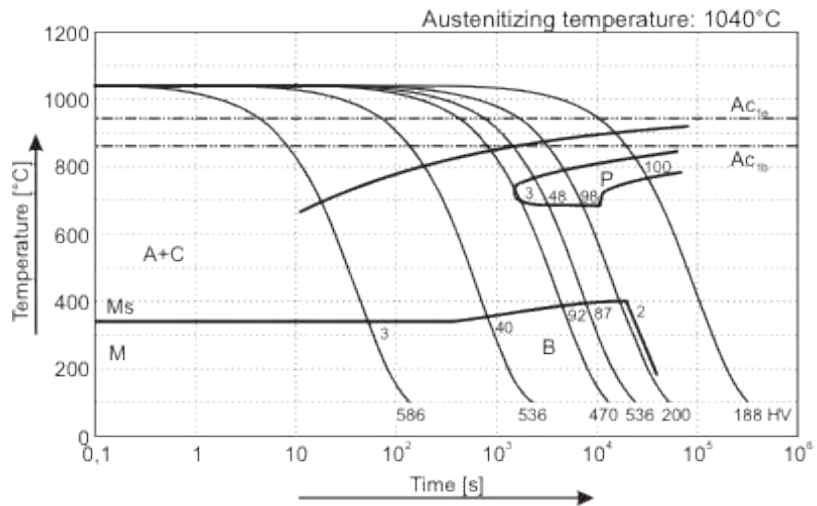
Hardening

Temperature	Cooling	Tempering
1020 - 1060°C	oil, pressure gas (N ₂) air or hot bath 500 - 550°C	see tempering diagram

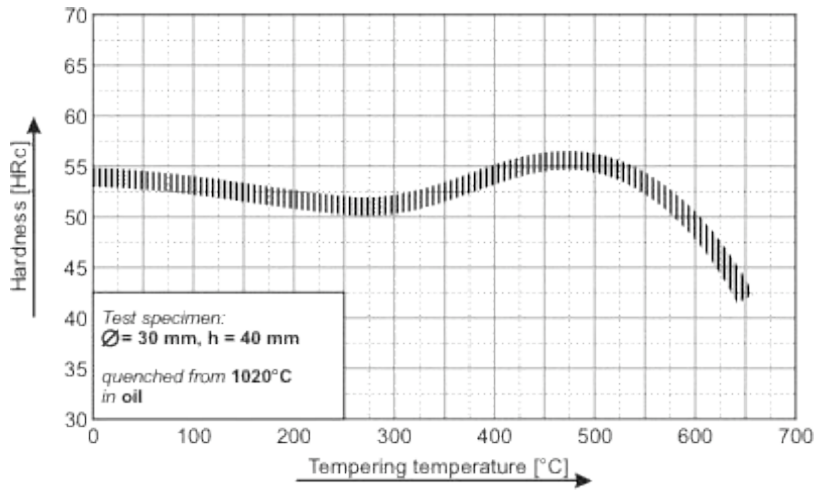
Thermal Cycle Diagram



Continuous Cooling Transformation Diagram (CCT)



Tempering Diagram



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