

# HIGH SPEED STEELS

## Application Segments

Cutting Tools

## Available Product Variants

Long Products

## Product Description

Twist drills, taps, wood working tools.

## Process Melting

Airmelted

## Properties

- > Toughness & Ductility : high
- > Wear Resistance : good
- > Compressive strength : good
- > Edge Stability : good
- > Grindability : high
- > Hot Hardness (red hardness) : good

## Applications

- > Special Cutting Tools
- > Twist Drills and Taps

## Technical data

Material designation		
	1.3325	SEL
	M50	AISI

## Chemical composition (wt. %)

C	Si	Mn	Cr	Mo	V
0.83	0.5	0.3	4.1	4.3	1.05

## Delivery condition

Annealed	
Hardness (HB)	max. 280

Heat treatment

Annealing		
Temperature	770 to 840 °C	Controlled slow cooling in furnace (10 to 20°C/h / (50 to 68°F/h) to approx. 600°C (1112°F), air cooling.
Stress relieving		
Temperature	600 to 650 °C	Slow cooling in furnace.    To relieve stresses set up by extensive machining or in tools of intricate shape.    After through heating, hold in neutral atmosphere for 1 to 2 hours.
Hardening and Tempering		
Temperature	1,100 to 1,130 °C	Salt bath, vacuum    Preheating: 1st stage ~ 500 °C, 2nd stage ~ 850 °C, 3rd stage ~1050 °C    Austenitising: 1100 - 1130 °C, holding time after complete heating 80 seconds, maximum 150 seconds, to avoid material damage due to overheating.   Quenching: oil, warm bath (500 - 550 °C), gas

Physical Properties

Temperature (°C)	20
Density (kg/dm³)	7.83
Thermal conductivity (W/(m.K))	19
Specific heat (kJ/kg K)	0.46
Spec. electrical resistance (Ohm.mm²/m)	0.5
Modulus of elasticity (10³N/mm²)	217

Thermal Expansions between 20°C | 68°F and ...

Temperature (°C)	100	200	300	400	500	600	700
Thermal expansion (10 <sup>-6</sup> m/(m.K))	11.5	11.7	12.2	12.4	12.7	13	12.9

If other available product variants are listed in addition to long products, please note that these may differ in terms of melting process, technical data, delivery and surface condition as well as available product dimensions. For mandatory technical specifications, other requirements and dimensions, please contact our regional voestalpine BÖHLER sales companies. The data contained in this brochure is merely for general information and therefore shall not be binding on the company. We may be bound only through a contract explicitly stipulating such data as binding. Measurement data are laboratory values and can deviate from practical analyses. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.

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