DIN - Material - No. 1.3351

Code

Comparable standards AISI: M4

Chemical composition (Typical analysis %)

C	Cr	Mo	V	W
1.33	4.2	4.9	4.1	5.9

Steel properties

Molybdenum high - speed tool steel. Very high resistance to softening at elevated temperatures. Highest resistance to wear and high hardness due to relatively high 1.3% Carbon. Deep hardening response.

Physical properties

Density g/cm^3 20°C: 7.97

Coefficient of linear thermal expansion

10^{-6} °C^{-1}

20-100	20-200	20-300	20-400	20-500	20-600	20-700	20-800°C
9.4	10.4	10.9	11.3	11.5	11.8	12.0	12.1

Applications

Reamers, heavy duty milling cutters, broaches.

Stress Relieving

Holding at approx 650°C for one hour.

Heat treatment

Soft annealing °C	Cooling	Hardness HB
820 - 880	furnace	255

Heat up °C	Preheating 1. step °C	Preheating 2. step °C	Hardening from °C	in	Temparing °C	As tempered hardness HRC
450 - 600	850	1050	1190 - 1230	oil, air, thermal bath 550°C	3 x 1h 540 - 560	64 - 66

Tempering °C	200	300	400	500	525	550	575	600	650	700
HRC	63	62	62	64	64.5	65	64	62	57	47

Transformation Temperatures
Ac_1 = 803 C, Ac_3 = 895 C

Tempering Diagram