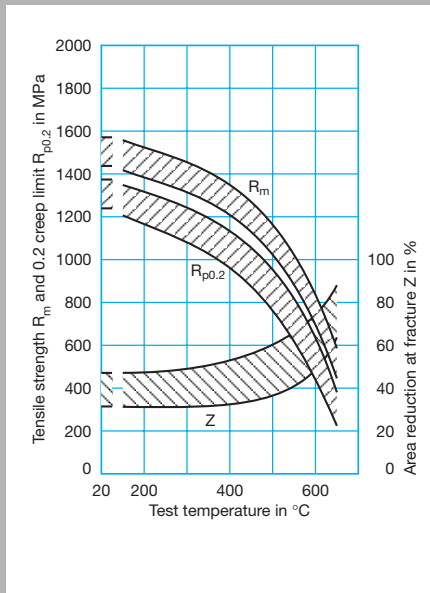
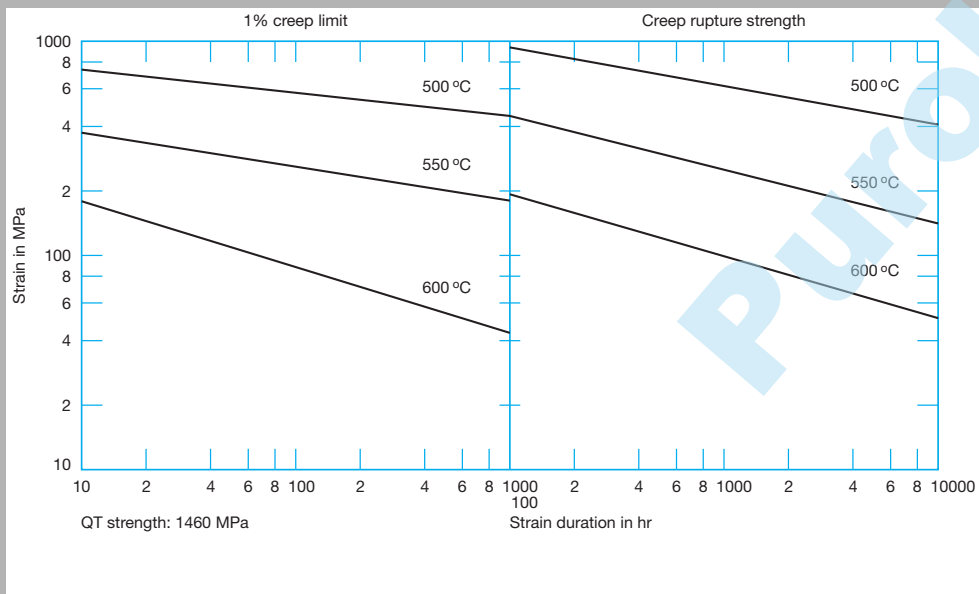


High-temperature strength diagram



Creep process



Chemical composition Typical analysis in %

C	Si	Cr	Mo	V
0.40	1.0	5.3	1.4	1.0

Steel properties

High hot-wear resistance, high hot tensile strength and toughness. Good thermal conductivity and insusceptibility to hot cracking. Can be water-cooled to a limited extent.

Physical properties

Coefficient of thermal expansion $10^{-6} \text{ m}/(\text{m} \cdot \text{K})$	20 – 100 °C	20 – 200 °C	20 – 300 °C	20 – 400 °C	20 – 500 °C	20 – 600 °C	20 – 700 °C
	10.9	11.9	12.3	12.7	13.0	13.3	13.5

Thermal conductivity $W/(\text{m} \cdot \text{K})$

	20 °C	350 °C	700 °C
Annealed	27.2	30.5	33.4
Quenched and tempered	25.5	27.6	30.3

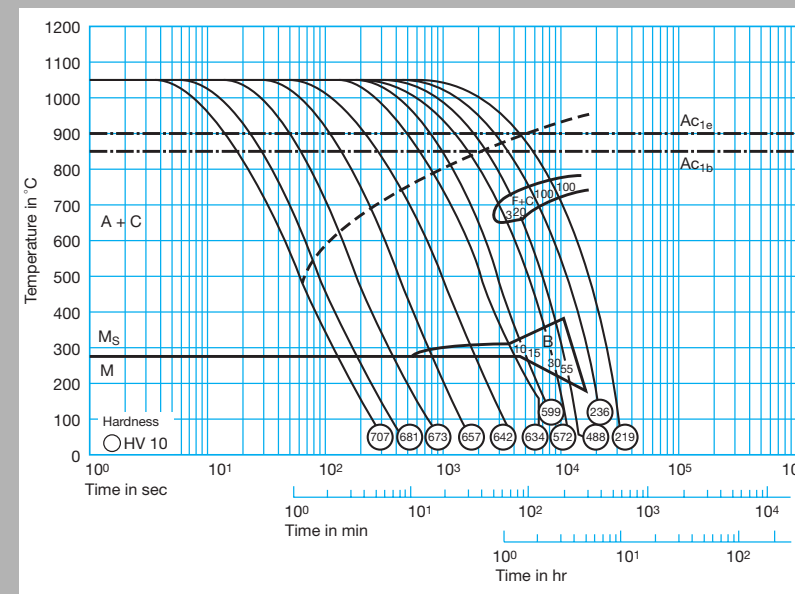
Applications

Hot-work steel for universal use. Pressure casting dies and metal extrusion tools for processing light metals, forging dies, mandrels. Moulds, screws and barrels for plastic processing, nitrided ejectors, hot-shear blades. We recommend the use of THYROTHERM® 2344 EFS SUPRA (ESR) for the highest demands.

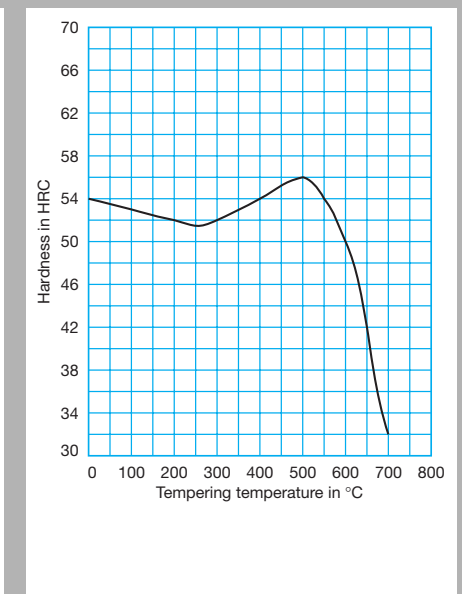
Heat treatment

Soft annealing °C	Cooling	Hardness HB							
750 – 800	Furnace	max. 230							
Hardening °C	Quenching	Hardness after quenching HRC							
1010 – 1030	Air, oil or saltbath, 500 – 550 °C	54							
Tempering °C									
	100	200	300	400	500	550	600	650	700
HRC	53	52	52	54	56	54	50	42	32

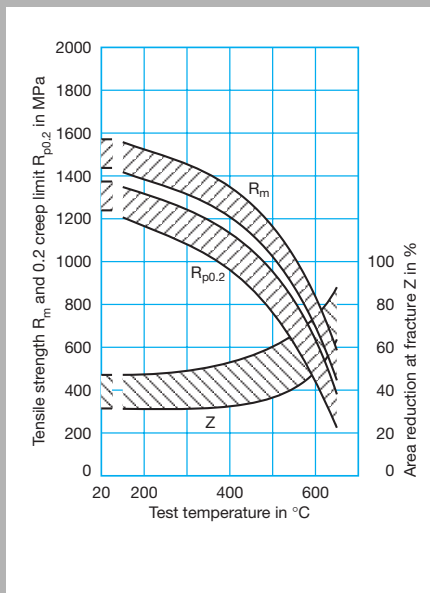
Time-temperature-transformation diagram



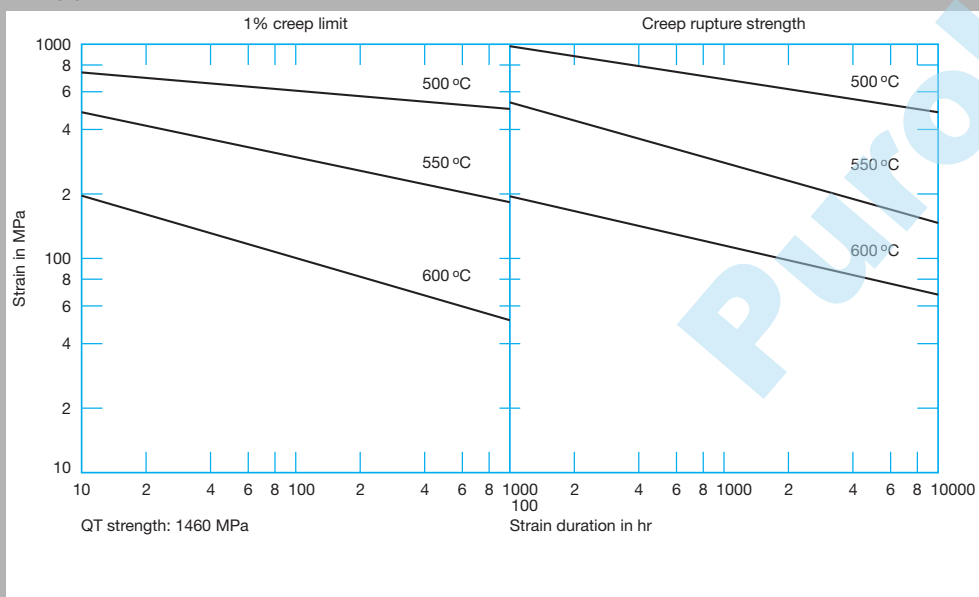
Tempering diagram



High-temperature strength diagram



Creep process



Chemical composition Typical analysis in %

C	Cr	Mo	V
0.32	3.0	2.8	0.5

Steel properties

Good high-temperature strength and tempering resistance, good thermal conductivity, can be water-cooled, suitable for hobbing.

Physical properties

Coefficient of thermal expansion $10^{-6} \text{ m}/(\text{m} \cdot \text{K})$	20 – 100 °C	20 – 200 °C	20 – 300 °C	20 – 400 °C	20 – 500 °C	20 – 600 °C
	12.21	12.65	12.85	13.31	13.59	13.77

Thermal conductivity $\text{W}/(\text{m} \cdot \text{K})$

	20 °C	350 °C	700 °C
Annealed	32.8	34.5	32.2
Quenched and tempered	31.4	32.0	29.3

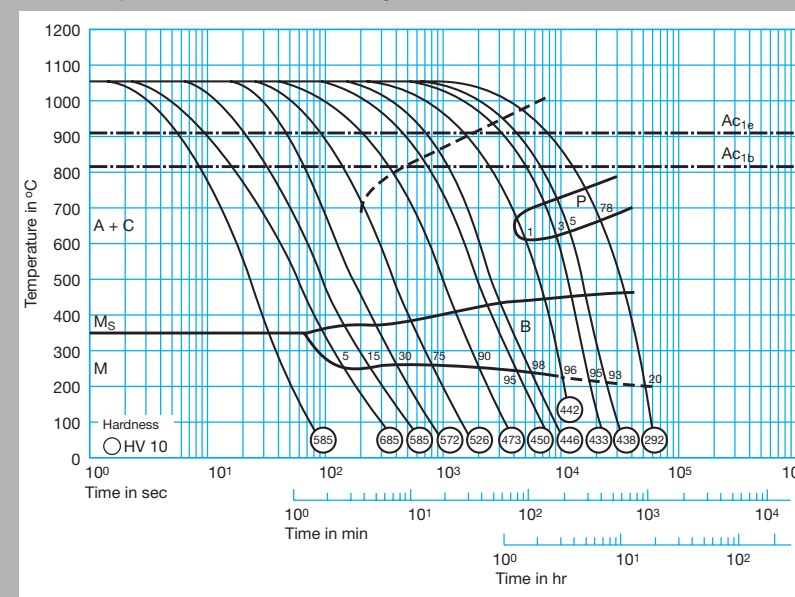
Applications

Heavy-metal inner linings, extrusion rams, piercing mandrels, die inserts, heavy-metal diecasting tools. We recommend the use of THYROTHERM® 2365 EFS SUPRA (ESR) for the highest demands.

Heat treatment

Soft annealing °C	Cooling	Hardness HB							
750 – 800	Furnace	max. 185							
Hardening °C	Quenching	Hardness after quenching HRC							
1010 – 1030	Air, oil or saltbath, 500 – 550 °C	52							
Tempering °C	100	200	300	400	500	550	600	650	700
HRC	51	50	50	50	52	50	47	40	34

Time-temperature-transformation diagram



Tempering diagram

