

Thermodur

2999 EFS Superclean

X45MoCrV5-3-1

C 0.45 Si 0.30 Mn 0.30 Cr 3.00 Mo 5.00 V 1.00

Steel properties

Maximum high-temperature strength, good high-temperature wear resistance, excellent thermal shock resistance and thermal conductivity across the entire range of service temperatures.

Physical properties

Coefficient of thermal expansion

at °C	20 – 100	20 – 200	20 – 300	20 – 400	20 – 500	20 – 600	20 – 700
$10^{-6} \text{ m/(m} \cdot \text{K)}$	11.3	11.9	12.2	12.6	13.0	13.3	13.5

Thermal conductivity

at °C	20	350	700
$\text{W/(m} \cdot \text{K)}$ Annealed	37.8	39.5	39.5
$\text{W/(m} \cdot \text{K)}$ Quenched and tempered	31.4	35.2	36.2

Applications

Die inserts and high-speed forging tools exposed to severe wear stresses, heavy metal die casting, hot-work tool steels for use at highest temperatures.

Heat treatment

Soft annealing °C
750 – 800

Cooling
Furnace

Hardness HB
max. 230

Hardening °C
1070 – 1100

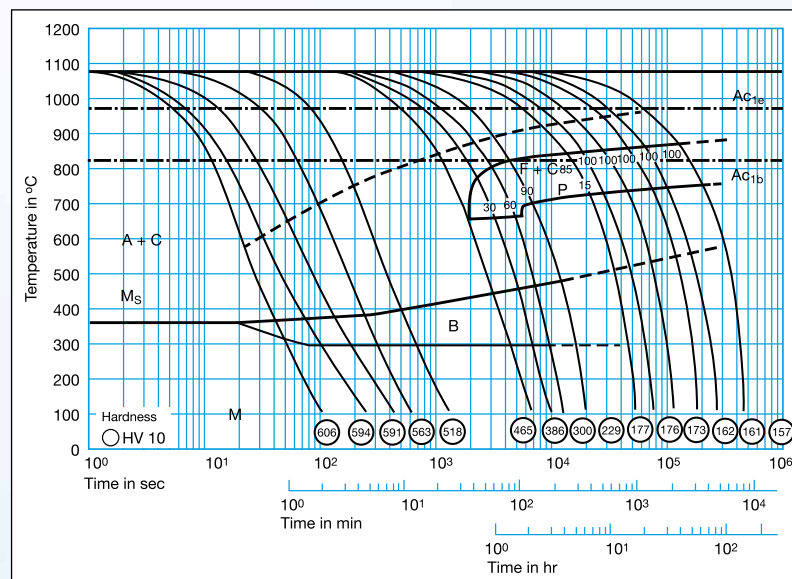
Quenching
Oil or
hot bath, 500 – 550 °C

Hardness after quenching HRC
57

Tempering °C
HRC

100	200	300	400	500	550	600	650
55	54	54	55	56	57	53	46

Time-temperature-transformation diagram



Tempering diagram

