1.2367

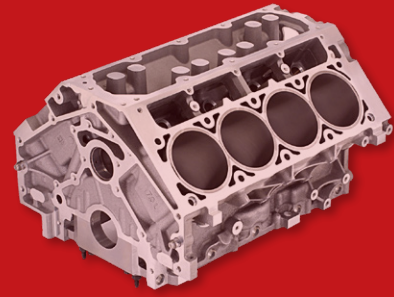## Hot working steel

1 Main characteristics and applications

3% Molybdenum alloyed hot working steel for very high thermal stress and hot strength.
For wear sensitive hot working tools and inserts.
To be used for die casting inserts, forging machine dies, mandrels hot extrusion tools, hot shear blades.
Steel can be nitrided after hardening and final machining.

2 Comparable standards

UNI	W.Nr	DIN	AFNOR	AISI/SAE	BS
-	1.2367	X38CrMoV5-3	-	-	-

3 Chemical composition (typical; in weight %)

C	Mn	Si	P	S	Cr	Mo	V
0.38	0.42	0.35	0.020	0.003	5	3	0.50

4 Production technology

EAF – LF – VD - Forging – Heat treatment +A

5 US specification

In according to standard EN10228-3 Class 4 and standard SEP 1921 Class E/e

6 Delivery condition

W1.2367 is delivered in annealed condition, with hardness max 229 HB (21 HRC).

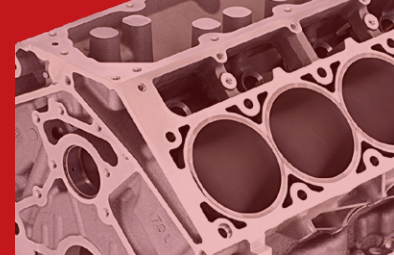### 7 Critical points

Ac1   860°C
Ac3   940°C
Ms   265°C

8 Physical properties (reference values)

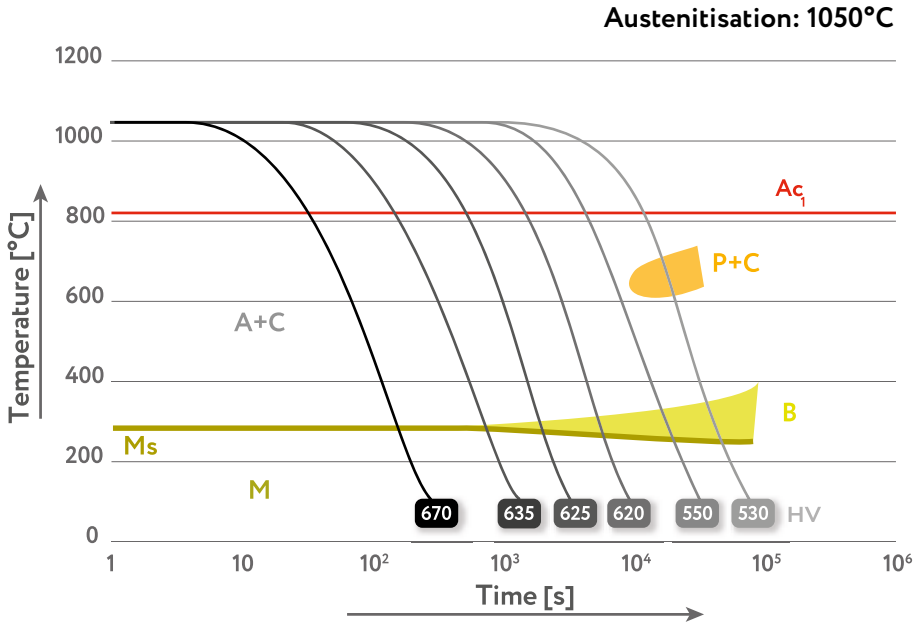|	20°C	100°C	250°C	500°C
Thermal expansion coefficient (10-6/K)	11.3	11.7	12	13
Thermal conductivity (W/mk)	18.8	19	22.9	24.9
Young modulus (Kn/mm2)	212	209	201	175

9 Heat treatment

TREATMENT	TEMPERATURE	HOLDING TIME (HT)	COOLING	COMMENTS
Annealing	Heat to 850 °C	Min. H.T. for 2 minute /mm	Furnace up to 600°C	-
Stress relieving	Heat to 600-650°C	Min. H.T. for 2 minute /mm	Furnace	To be carried out after machining, is recommended to eliminate the residual stresses induced by mechanical working
Hardening	Preheating to 350-400°C Second preheating to 750-800°C Austenitizing to 1030-1050°C	Min. H.T. for 1 minute /mm	Air, vacuum, oil	Quenched hardness 53-58HRC
Tempering	Tempering must be repeated at least three times after the hardening, with preheating to 350 ÷ 400 °C. Initial tempering at about the same temperature of the secondary hardness. Second tempering useful to obtain the work hardness, normally 35 ÷ 50 HRC. Third tempering at 30 ÷ 40 °C lower than the second tempering			

10 C.C.T. curve

Austenitisation: 1050°C

11 Tempering curve