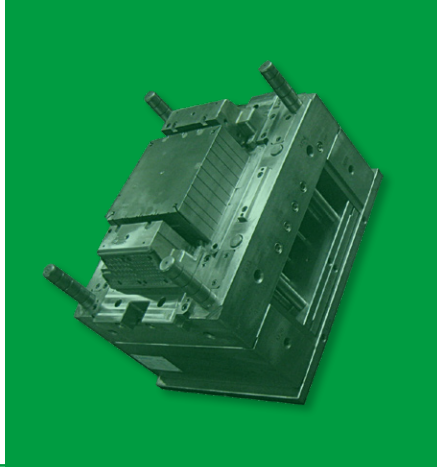
VR16 VR16HH

Plastic mould steel



1 Main characteristics and applications

VR16 is a Pre-hardened stainless martensitic Chrome-Molybdenum steel with excellent toughness, good polishability, improved machinability and excellent resistance to corrosion.
Main benefits of steel with excellent corrosion resistance are:
- Lower mould maintenance cost .
- Higher production performance due to the lower production cost (cooling channels are not affected by corrosion).

Applications:
- plastic moulds.
- particularly for corrosive plastic as PVD.
- Dies for plastic extrusion.
- Mould for household appliances.

2 Chemical composition (typical; in weight %)

C	Mn	Si	Cr	Mo	Ni	P	S
0.28	0.9	0.30	14	1	0.7	0.008	0.003

3 Production technology

EAF – LF – VD - Forging – Rolling - Heat treatment QT

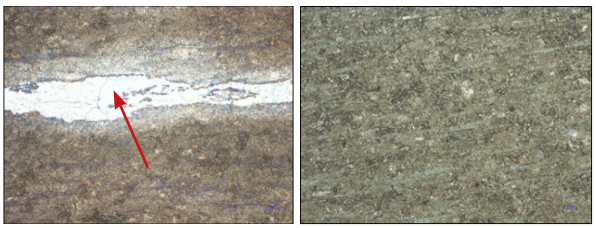
4 US specification

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

5 Delivery condition

VR16 is delivered in quenched and tempered condition:
VR16, Standard version: hardness range 280 - 325 HB (29 – 35 HRC)
VR16HH, High hardness: hardness range 350 - 390HB (38 – 42 HRC)

6 Microstructure

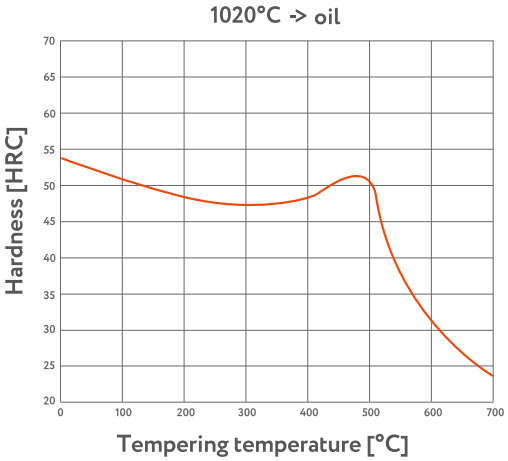


W1.2316	VR16
50X Martensitic structure with carbides	50X Homogenous microstructure, without carbides

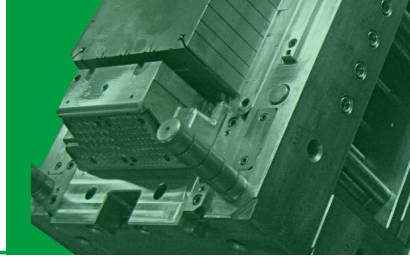
7 Physical properties (reference values)

	20°C	100°C	250°C	500°C
Thermal expansion coefficient (10-6/K)	10.5	10.5	10.9	11.7
Thermal conductivity (W/mk)	23.4	23.7	24	-
Young modulus (Kn/mm2)	218	213	205	180

8 Tempering curve



VR TOOL STEELS® NLMK Verona

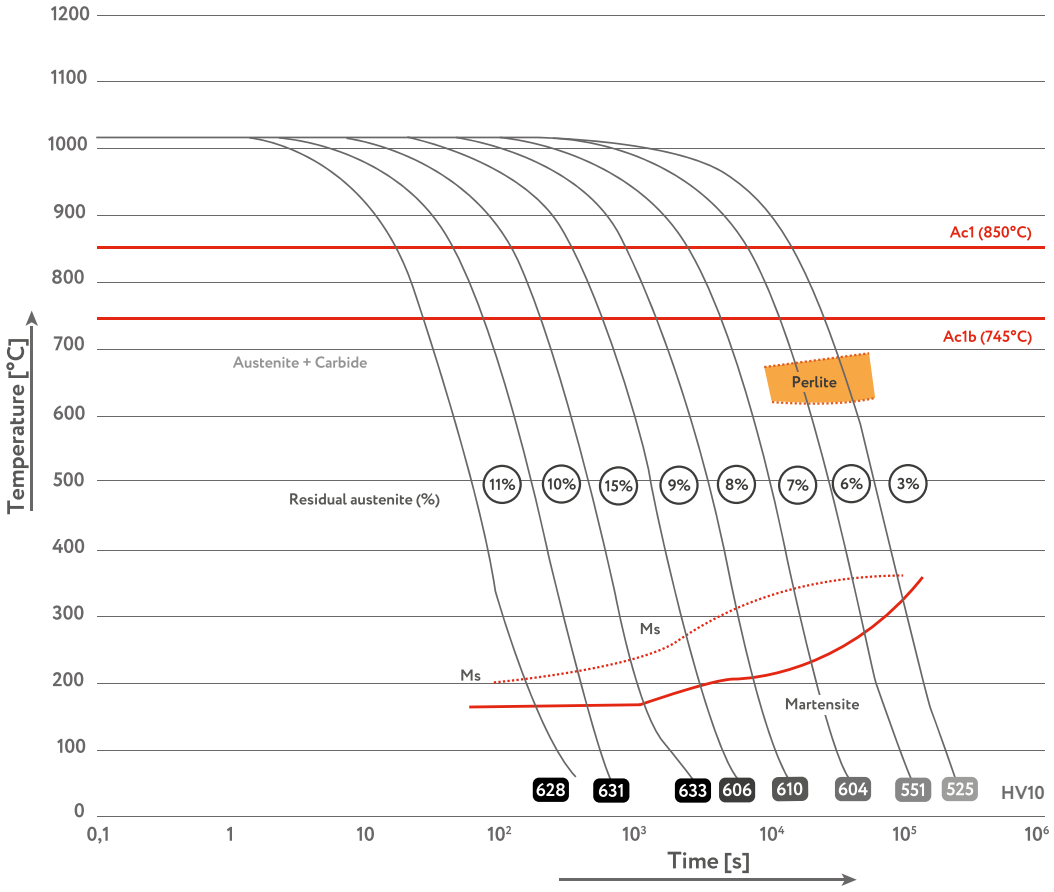


9 Heat treatment

TREATMENT	TEMPERATURE	HOLDING TIME (HT)	COOLING	COMMENTS
Annealing	Heat to 770 - 820 °C	Min. H.T. for 2 minute /mm	Furnace up to 600°C than in air	-
Stress relieving	Heat to 550 - 600 °C	Min. H.T. for 2 minute /mm	Air or furnace	To be carried out after machining, is recommended to eliminate the residual stresses induced by mechanical working
Hardening	Preheating to 600-700°C. Austenitizing to 990 - 1040 °C	Min. H.T. for 1 minute /mm	Polymer or gas air	Qunched hardness 50 HRC
Tempering	-	-	Air	To be carried out after hardening. 2nd Tempering must be performed to max 30°C below tempering temperature

10 C.C.T. curve

Austenitisation: 1020°C, 30 min.



NLMK Verona S.p.A
Via Antonio Salieri, 22 - 37050 Vallese di Oppeano (VR) - Italy
Tel. : +39 045 69 97 900 - Fax : +39 045 69 97 915
toolsteel.verona@eu.nlmk.com - toolsteels.nlmk.com