

WARMWERKSTAAL

Beschikbare uitvoeringen

Stafstaal

Product omschrijving

BÖHLER W403 VMR - In vacuüm geproduceerd warmwerkstaal met zeer hoge hittebestendigheid – en daardoor maximale bestendigheid tegen brandscheuren.

Smeltroute

Airmelted + VAR

Eigenschappen

- > Taaiheid & Vervormbaarheid : hoog
- > Slijtageweerstand : hoog
- > Bewerkbaarheid : goed
- > Hete hardheid (rode hardheid) : hoog
- > Polijstbaarheid : zeer hoog
- > Warmtegeleidingsvermogen : zeer hoog
- > Microzuiverheid : zeer hoog

Toepassingen

- > Spuitgieten
- > Zwaartekrachtgieten / lagedruk gieten
- > Progressief smeedwerk (Hatebur)
- > Glasfibre reinforced plastics
- > Smeedwerk (warm / halfwarm)
- > Spuitgieten
- > Extrusie
- > Algemene componenten voor werktuigbouw
- > Dieptrekken / warmvormprocedé
- > Werktuigbouw / machinebouw Algemeen

Technische gegevens

Materiaal aanduiding		Normen	
~1.2367	SEL	#207	NADCA
~X38CrMoV5-3	EN		
C1885	NADCA		

Chemische samenstelling

C	Si	Mn	Cr	Mo	V
0,38	0,20	0,25	5,00	2,80	0,65

Materiaaleigenschappen

	Hete kracht	Hete taatheid	Weerstand tegen hete slijtage
BÖHLER W403 VMR®	★★★★	★★★★	★★★★
BÖHLER W300 ISOBLOC®	★★	★★★★	★★
BÖHLER W300 ISODISC®	★★	★★★	★★
BÖHLER W302 ISOBLOC®	★★★	★★★★	★★★
BÖHLER W302 ISODISC®	★★★	★★★	★★★
BÖHLER W303 ISODISC®	★★★★	★★★	★★★★
BÖHLER W350 ISOBLOC®	★★★	★★★★★	★★★
BÖHLER W360 ISOBLOC®	★★★★★	★★★★	★★★★★
BÖHLER W400 VMR®	★★	★★★★★	★★

Leveringsconditie

gegloeid

Hardheid (HB)	max. 205
---------------	----------

Warmtebehandeling

Annealing

Temperatuur	750 naar 800 °C	Holding time 6 to 8 hours. Slow, controlled furnace cooling at 10 to 20°C/h (50 to 68 °F/hr) to approx. 600°C (1112°F), further cooling in air.
-------------	-----------------	---

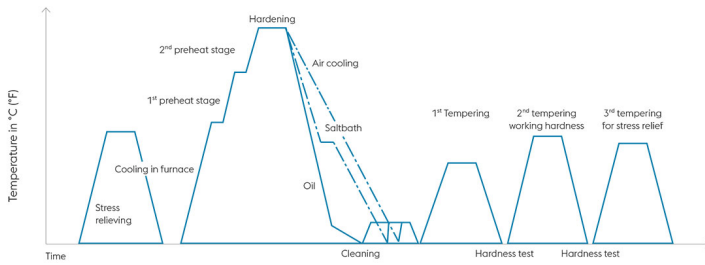
Stress relieving

Temperatuur	600 naar 670 °C	For stress relief after extensive machining or for complicated tools. Holding time depending on tool size after complete heating 2 - 6 hours in neutral atmosphere. Slow furnace cooling.
-------------	-----------------	---

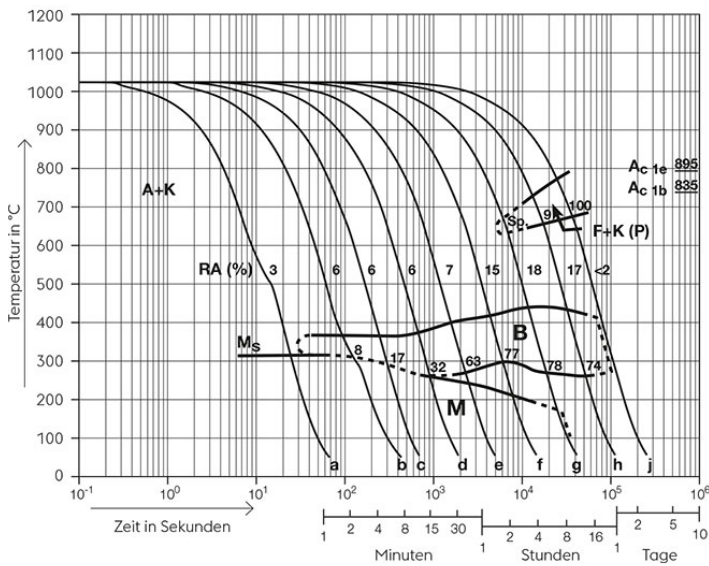
Harden en ontlaten

Temperatuur	1.020 naar 1.030 °C	Holding time after temperature equalization: 15 to 30 minutes; In order to prevent coarsening of the grain, hardening must be carried out at the recommended temperature; Quenching: oil, salt bath (500 - 550°C [930 to 1020 °F]), air, inert gas in vacuum; After hardening, required tempering treatment to achieve desired working hardness (see tempering chart).
-------------	---------------------	--

Heat treatment sequence



Continuous cooling CCT curves

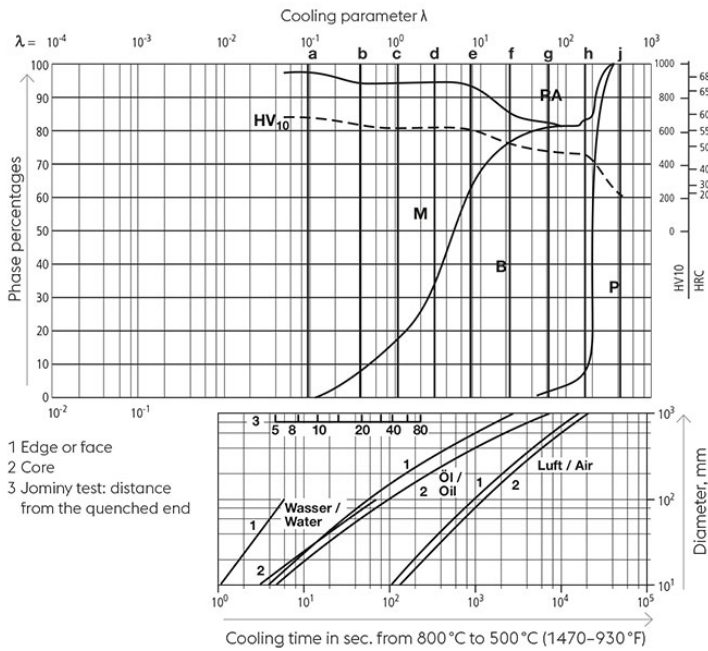


Austenitising temperature: 1025°C (1877°F)
 Holding time: 15 minutes
 5...100 phase percentages
 0.5...180 cooling parameter, i.e. duration of cooling from 800 - 500°C (1472-932°F) in $s \times 10^{-2}$

Table:

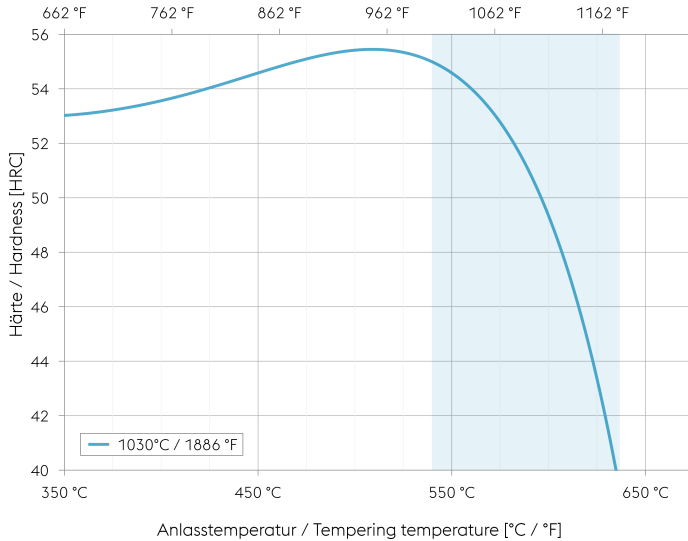
Sample	λ	HV10	Sample	λ	HV10
a	0,1	686	f	23	529
b	0,4	643	g	65	494
c	1,1	619	h	180	465
d	3	624	j	400	234
e	8	615			

Quantitative phase diagram



A... Austenite
B... Bainite
K... Carbide
M... Martensite
P... Pearlite
RA... Retained austenite

Tempering chart



Tempering:

Slow heating to tempering temperature immediately after hardening (time in furnace 1 hour for each 0,787 inch (20 mm) of workpiece thickness but at least 2 hours / cooling in air).

It is recommended to temper at least twice.

A third tempering cycle for the purpose of stress relieving may be advantageous.

1st tempering approx. 86°F (30°C) above maximum secondary hardness.

2nd tempering to desired working hardness. The tempering chart shows average tempered hardness values.

3rd for stress relieving at a temperature 86 to 122°F (30 to 50°C) below highest tempering temperature.

Recommended tempering temperature range is indicated by the blue area in the chart.

Hardening temperature: 1030°C (1886°F)
Specimen size: square 20 mm

Fysische eigenschappen

Temperatuur (°C)	20
Soortelijk gewicht (kg/dm ³)	7,9
Thermische conductiviteit (W/(m.K))	29,8
Soortelijke warmte (kJ/kg K)	0,47
Specifieke elektrische weerstand (Ohm.mm ² /m)	-
Elasticiteitsmodus (10 ³ N/mm ²)	211

Thermische expansie

Temperatuur (°C)	100	200	300	400	500	600
Thermische expansie (10 ⁻⁶ m/(m.K))	10,6	10,8	12	12,9	14,1	14,3

For additional specifications and technical requirements, please contact our regional voestalpine BÖHLER sales companies.

The data contained in this brochure is merely for general information and therefore shall not be binding on the company. We may be bound only through a contract explicitly stipulating such data as binding. Measurement data are laboratory values and can deviate from practical analyses. The manufacture of our products does not involve the use of substances detrimental to health or to the ozone layer.