ASSAB VIMCOR

ASSAB
a voestalpine company

ASSAB VIMCOR - 20260728-8

GENERAL

ASSAB VIMCOR is a non-standardized low-carbon martensitic stainless steel produced through a special metallurgical process including VOD, ensuring superior quality and performance.

ASSAB VIMCOR offers the following characteristics:

- Excellent machinability
- Good corrosion resistance
- High dimensional stability
- Superior surface finish
- High weldability

Typical analysis %	C 0.05	Si 0.40	Mn 2.50	Cr 12.30	S 0.10
Standard Specification	None				
Delivery condition	Hardened and tempered to ~310HB				

APPLICATIONS

- Mould bases (holder/bolsters, cavity plates. Support/backing plates, ejector plates)
- Hot runners
- Refrigeration plates
- Plastic injection or rubber moulds with low demand on surface finish
- Structural components

PROPERTIES

Physical data

Prehardened to 320 HB

Temperature	20 °C	100 °C	200 °C
Density kg/m^3	7 740	7 700	7 670
Modulus of elasticity MPa	220 000	-	203 000
Coefficient of thermal expansion /°C from 20 °C	-	10.57 X 10^{-6}	11.16 X 10^{-6}
Thermal conductivity W/m°C *	-	27.5	28.0
Specific heat J/kg°C	-	505	576

* Thermal conductivity is very difficult to measure. The scatter may be as high as ±15%.

MECHANICAL PROPERTIES

Approximate values:

Hardness	320 HB
Impact energy, J (1)	15
Compressive Strength, Rc0.2 MPa	813
Yield Strength, Rp0.2 MPa (2)	967
Tensile strength, Rm MPa (2)	1 125
Elongation % (2)	14
Reduction of Area % (2)	60

Block thickness 200 mm, Width 900 mm.
All tests are carried out at room temperature.

(1) Specimens for impact testing are taken from the LT direction of the block core.

The energy absorption at impact testing depends on the test material (block size and delivered hardness), test temperature and specimen (type, location, and orientation in the block).

(2) Specimens for tensile testing are taken from the longitudinal direction of the block core.

HEAT TREATMENT

ASSAB VIMCOR is supplied in the prehardened condition with through hardness 285-320 HB. Each plate is carefully hardness tested to ensure consistency. ASSAB VIMCOR is intended for use in prehardened condition (i.e. delivery condition), no further heat treatment is generally required.

Hardening

Preheating temperature: 400–650°C.
Austenitising temperature: 890–910°C.

ASSAB VIMCOR is already supplied in prehardened condition and heat treatment of quench and temper is not required. When necessary, preheat the part in two steps, until the temperature from centre to surface is equal in each step. The austenitising temperature should be held until complete homogenization of the part.
Surface decarburisation cause decrease in hardness and may cause polishing problems named "overpolishing". Therefore, the use of protective atmosphere (or vacuum) is important during heating to hardening.

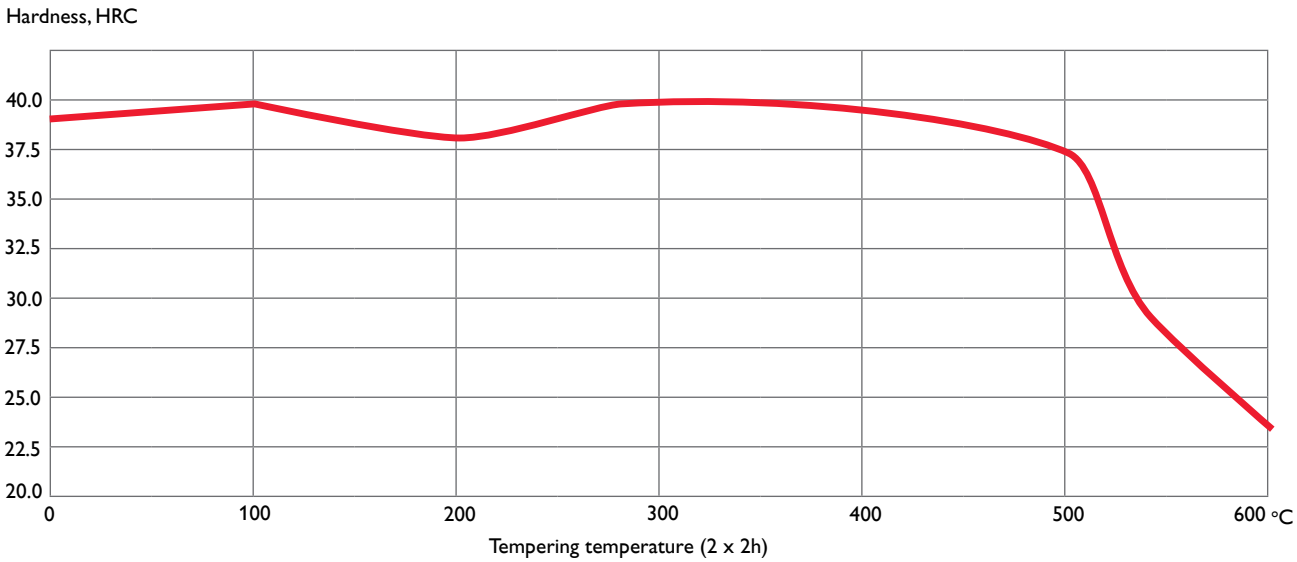
After austenitisation, the quenching can be performed in warm and agitated oil, 30-70°C until the part temperature reaches 100°C, followed by air cooling until 60-70°C. The maximum expected hardness will be up to 40 HRC.

Tempering

After quenching, the parts shall be tempered immediately as soon as it reaches 60°C. It is necessary to double temper. After each tempering, parts shall be slowly cooled to room temperature.

Tempering temperatures are generally between 500-600°C, depending upon the desired hardness. The time of each tempering cycle shall be at least 1 hour for each 25.4mm of thickness after temperature equalization between surface and core.

TEMPERING GRAPH



Note: The curve as shown in the tempering graph are valid for small samples (20mm x 20mm x 20mm). Actual hardness achieved after hardening and tempering depends on the mould size.

MACHINING RECOMMENDATIONS

The cutting data below are to be considered as guiding values which must be adapted to existing local conditions.

Condition: prehardened approx. 320HB

Turning

Cutting data parameter	Turning with carbide		Turning with High Speed Steel
	Rough turning	Fine turning	Fine turning
Cutting speed (V_c), m/min	130 – 190	190 – 250	25 - 28
Feed (f), mm/rev	0.2 – 0.4	0.05 - 0.2	0.05 - 0.3
Depth of cut (a_p), mm	2 – 4	0.5 - 2	0.5 - 3
Carbide designation ISO	P20 - P30 Coated carbide	P10 - P20 Coated Carbide or Cermet	-

Drilling

HIGH SPEED STEEL TWIST DRILL

Drill diameter mm	Cutting speed (Vc) m/min	Feed (f) mm/rev
< 5	17 - 19*	0.05 - 0.10
5 - 10	17 - 19*	0.10 - 0.20
10 - 15	17 - 19*	0.20 - 0.25
15 - 20	17 - 19*	0.25 - 0.30

* For coated HSS drill, Vc= 29 - 31 m/min

CARBIDE DRILL

Cutting data parameter	Type of drill		
	Indexable insert	Solid carbide	Carbide tip [1]
Cutting speed (Vc), m/min	215 - 240	110 - 130	70 - 110
Feed(f), mm/rev	0.05 - 0.15 [2]	0.10 - 0.25 [3]	0.15 - 0.25 [4]

1) Drill with replaceable or brazed carbide tip
2) Feed rate for drill diameter 20 - 40 mm
3) Feed rate for drill diameter 5 - 20 mm
4) Feed rate for drill diameter 10 - 20 mm

Milling

FACE AND SQUARE SHOULDER MILLING

Cutting data parameter	Milling with carbide	
	Rough milling	Fine milling
Cutting speed (V_c), m/min	130 – 190	190 – 250
Feed (f), mm/tooth	0.2 – 0.4	0.1 - 0.2
Depth of cut (a_p), mm	2 – 5	≤ 2
Carbide designation ISO	P20 - P40 Coated carbide	P10 - P20 Coated carbide or cermet

END MILLING

Cutting data parameter	Milling with carbide		
	Solid carbide	Carbide indexable insert	High speed steel
Cutting speed (V_c), m/min	80 – 120	120 – 170	35 - 40 [1]
Feed (f), mm/tooth	0.006 – 0.20 [2]	0.06 - 0.20 [2]	0.01 - 0.35 [2]
Carbide designation ISO	-	P15 - P40	-

1) For coated HSS end mill Vc = 60 - 66 m/min
2) Depending on radial depth of cut and cutter diameter

Grinding

A general grinding wheel recommendation is given below. More information can be found in the publication "Grinding of tool steel".

Type of grinding	Delivery condition
Face grinding straight wheel	A 46 HV
Face grinding segments	A 36 GV
Cylindrical grinding	A 60 KV
Internal grinding	A 60 JV
Profile grinding	A 120 JV

ELECTRICAL DISCHARGE MACHINING — EDM

Electro-erosion process can be employed in heat treated dies or moulds. After electro-erosion machining it is recommended to remove the superficial layer through fine grinding wheel. The white layer in ASSAB VIMCOR is not as hard as in AISI 420 or P20 grades, due to the lower carbon content. After electro-erosion process and removal of the white layer. A stress relief treatment at 400°C is recommended.

WELDING

ASSAB VIMCOR is readily weldable with RoyAlloy filler metal or several standard stainless filler metals, using TIG (GTAW) and MMA (SMAW) processes.

For best results, use RoyAlloy welding electrodes. To provide an optimal match with the base metal in terms of chemical composition and mechanical properties, RoyAlloy filler material is recommended.

The weld metal hardness after welding will become 34 – 38 HRC. The welding consumable, as TIG filler rod, is available in Ø 0.9 mm and Ø 1.8 mm.

Neither pre-heating nor post-heating is necessary. ASSAB VIMCOR does not develop an over-hardened heat affected zone (HAZ) around the weld deposit. This eliminates the concern of weld-induced cracking during repair or, subsequently, during service.

Stress relieving is recommended for large weld repairs to reduce residual stresses.

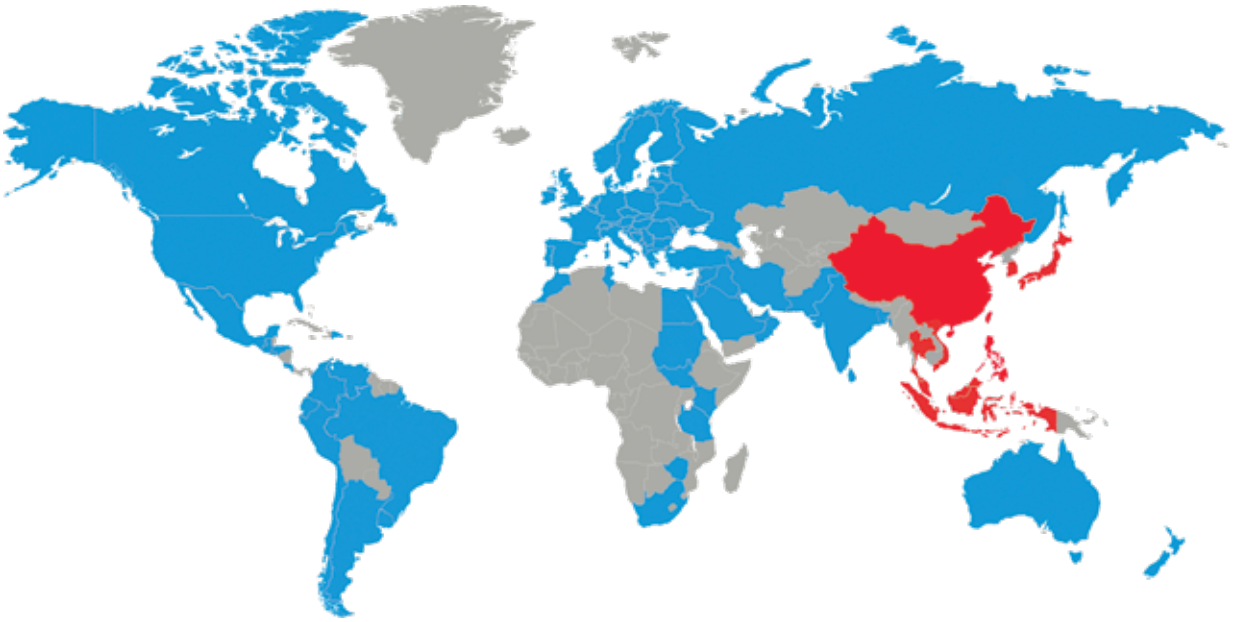
Max. stress relieving temperature 485 °C

FURTHER INFORMATION

Please contact your local ASSAB office for further information on the selection, heat treatment, application and availability of ASSAB tool steel.

ASSAB
SUPERIOR TOOLING SOLUTIONS
A ONE-STOP SHOP

ASSAB is a one-stop product and service provider that offers superior tooling solutions. In addition to the supply of tool steel and other special steel, our range of comprehensive value-added services, such as machining, heat treatment and coating services, span the entire supply chain to ensure convenience, accountability and optimal usage of steel for customers. We are committed to achieving solutions for our customers, with a constant eye on time-to-market and total tooling economy.



Choosing the right steel is of vital importance. ASSAB engineers and metallurgists are always ready to assist you in your choice of the optimum steel grade and the most suitable treatment for each application. ASSAB not only supplies steel products of superior quality, but we also offer state-of-the-art machining, heat treatment, surface treatment services and additive manufacturing (3D printing) to enhance your tooling performance while meeting your requirements in the shortest lead time. Using a holistic approach as a one-stop solution provider, we are more than just another tool steel supplier.

In Asia Pacific, ASSAB anchors the distribution network for Uddeholm, a Swedish tool steel manufacturer with more than 350 years of experience in the tool steel industry. Both are integral parts of voestalpine AG, a prominent Austrian-based company listed on the Vienna Stock Exchange since 1995. Together, we establish ourselves as a key player in the steel and technology sector, with a diverse range of products and services.

For more information, please visit:

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