

# 100CrMnSi6-6 All

## General Information

Ovako 832 is a through hardening bearing steel that is mainly used for medium sized bearing rings, but can also be used for machine components that require high tensile strength and high hardness.

- 40 mm maximum wall thickness for through hardening
- Used for martensitic hardening
- Can be induction hardened
- Good machinability in soft annealed condition
- Machiable in hardened condition using hard-turning techniques (CBN tools)
- Ovako 832 is weldable if pre-heated, otherwise risk of hot-cracking
- Very good dimension stability

832K - Bearing quality (BQ) variant

### BQ-Steel®

BQ-Steel® is a bearing quality clean steel optimized for fatigue strength and is also ideal for new design solutions outside the bearing industry.

### Similar designations

100CrMnSi6-4, ASTM A485 grade 2/B4

### Chemical composition

Variant	Cast		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
832K	IC	Min	0.87	0.60	1.50	-	-	1.40	0.10	0.06
		Max	0.97	0.80	1.70	0.015	0.015	1.70	0.25	0.10
EN ISO 683-17	Std	Min	0.93	0.45	1.40	-	-	1.40	-	-
		Max	1.05	0.75	1.70	0.025	0.015	1.65	-	0.10

## Mechanical Properties

Variant	Condition ⓘ	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Hardness
832K	+SA	All formats	24 < 190	-	-	230 HB typical
	+Q/T(m)	Ring, wall	< 15	1700	2300 typical	62 HRC typical

$RP_{0.2}$  \*  $R_{eh}$  \*\*  $R_{el}$

## Transformation temperatures

	Temperature °C
MS	229
AC1	749
AC3	723

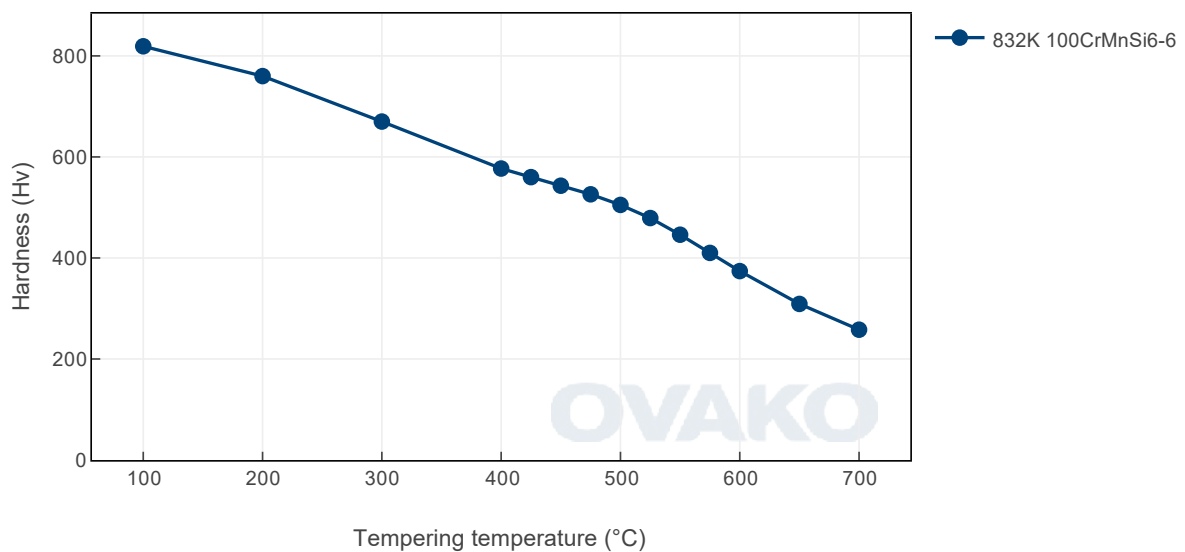
## Heat treatment recommendations

Treatment	Condition ⓘ	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1100C	In air
Normalizing	+N	880-910C	In air
Spheroidize annealing	+SA	RT-810°C 1h, 810°C 2h, 810-740°C 1h, 740-650°C 10h	In air
Stress relieve annealing	+SRA	550-650C 2h	In air
Quenching	+Q	830-870C 20-60 min (martensitic)	Oil quench (temper within 2h)
Tempering	+T	160-500C (see diagram)	In air

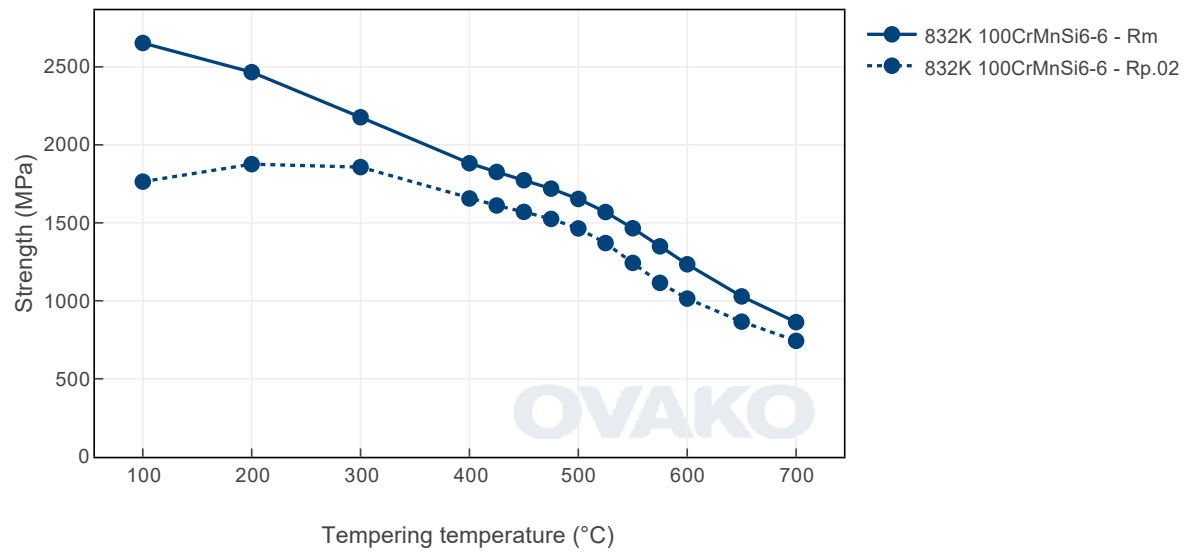
## Heat Treatment Guide generated Graphs

The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.

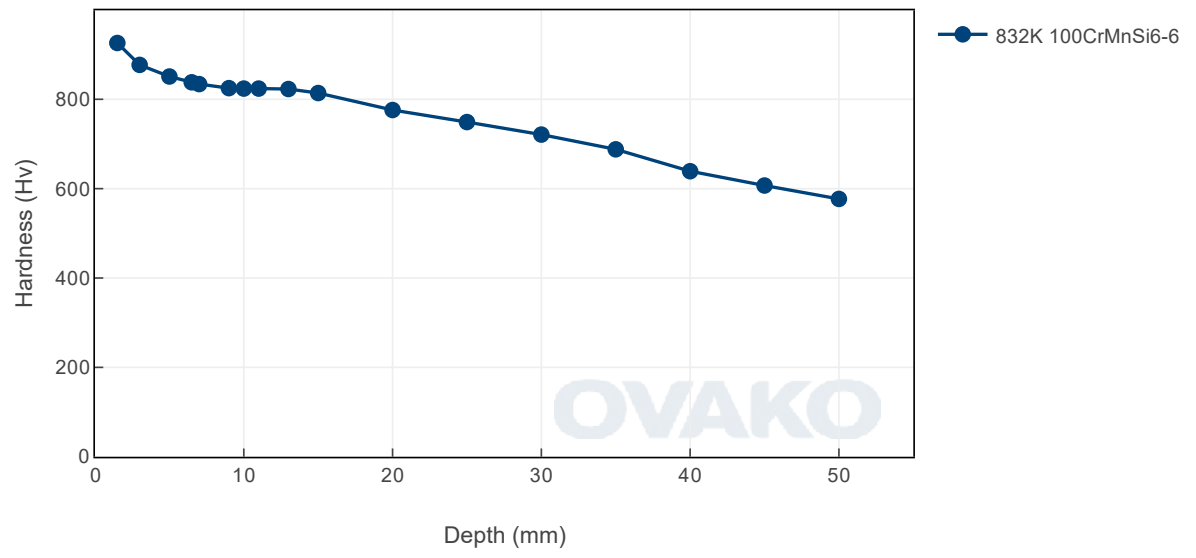
Tempering Diagram (hardness)



Tempering Diagram (strength)

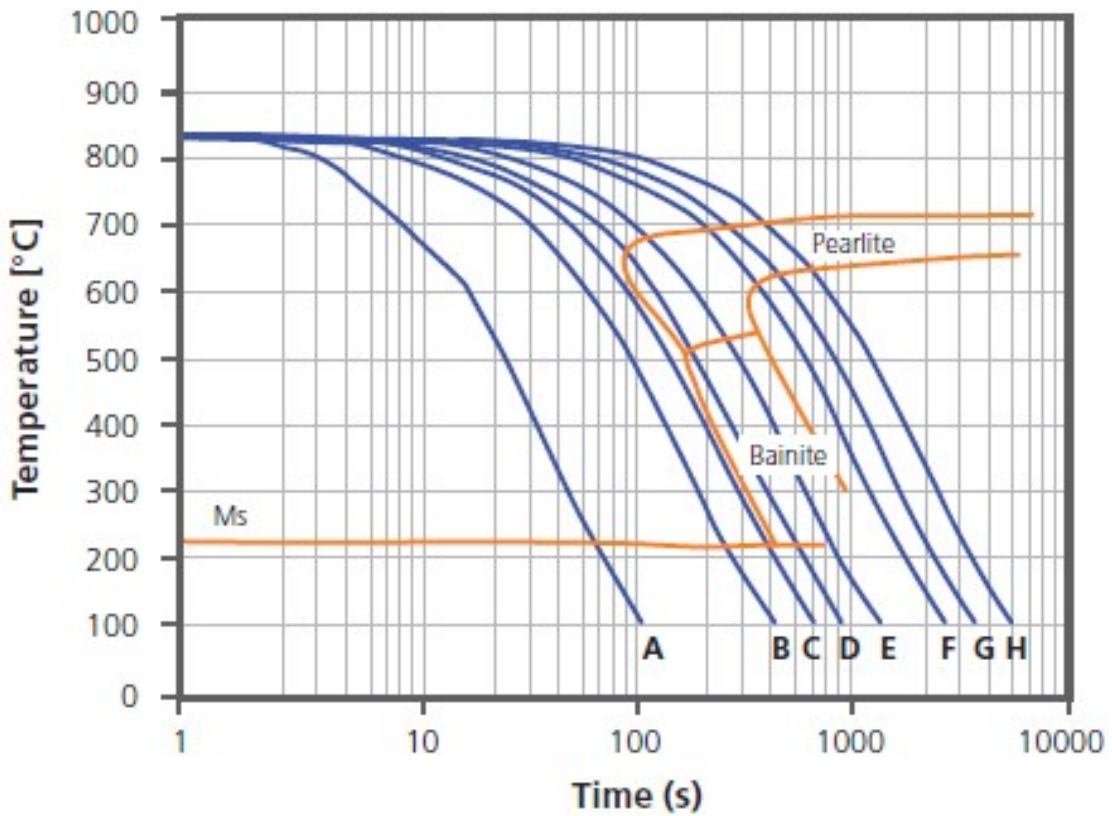


# Jominy



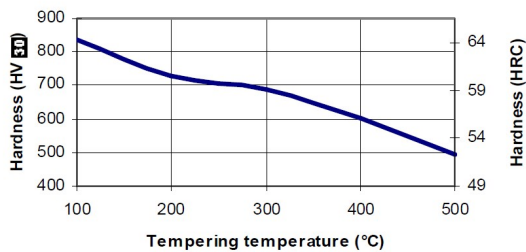


### CCT – Ovako 832 Austenitized at 830°C



	A	B	C	D	E	F	G
$T_{8-5}$ [s]:	25	100	150	200	500	800	1200
Hv <sub>30</sub> :	820	813	750	627	410	316	316

### Tempering response



Tempering response for Ovako 832K. Austenitized at 830°C for 30min and hardened in air. Tempered one hour at each tested temperature level

## Steel cleanliness

Micro inclusions								Macro inclusions	
Applied standard	ASTM E45							Applied standard	ISO 3763 (Blue fracture)
Sampling	ASTM A295							Sampling	Statistical testing on billets
Maximum average limits	A		B		C		D		
	Th	He	Th	He	Th	He	Th	He	
	2,0	1,5	0,8	0,1	0	0	0,5	0,3	
Limits								Limits	< 2,5 mm/dm <sup>2</sup>

## SUSTAINABILITY-ENVIRONMENTAL IMPACT DATA

At Ovako sustainability and reduction of our environmental impact is a major focus in everything we do.

Further information is found [here](#).

In many international comparisons the crude steel Scope 1-2 emission is a key parameter, ie. the CO<sub>2</sub> emission from the steel works itself.

As of 1 January 2022 we carbon offset all our scope 1 and 2 volume shown below.

Steel works	Hofors	Smedjebacken	Imatra
CO <sub>2</sub> e/kg	120	62	76

To get the full picture of our products environmental impact we have to look at all of our CO<sub>2</sub> emission sources.

Not only the steel work Scope 1-2 itself, but all operations downstream in our production, heating and heat treatment furnaces etc (full scope 1-2) as well as all the emission from input material, eg. alloys, scope 3.

Steel Grade	Format	Condition <sup>①</sup>	Scope 1-3 (CO <sub>2</sub> e kg /1000 kg steel)	Climate compensated Net emission = Scope 3 (CO <sub>2</sub> e kg /1000 kg steel) Scope 1 - 2 = 0 (compensated)
832K	Round bar	+SA	632	236
832K	Tube, wall	+SA	658	256

To get the full picture of our products environmental impact we have to look at all of our CO<sub>2</sub> emission sources.

Not only the steel work Scope 1-2 itself, but all operations downstream in our production, heating and heat treatment furnaces etc (full scope 1-2) as well as all the emission from input material, eg. alloys, scope 3.

## Other properties (typical values)

Youngs module (GPa)	Poisson 's ratio (-)	Shear module (GPa)	Density (kg/m <sup>3</sup> )
210	0.3	80	7800
Average CTE 20-300°C (µm/m°K)	Specific heat capacity 50/100°C (J/kg °K)	Thermal conductivity Ambient temperature (W/m°K)	Electrical resistivity Ambient temperature (µΩm)
12	460 - 480	40 - 45	0.20 - 0.25

## Contact us

Would you like to know more about our offers? Don't hesitate to contact us:

Via e-mail: [info@ovako.com](mailto:info@ovako.com)

Via telephone: +46 8 622 1300

For more detailed information please visit <http://www.ovako.com/en/Contact-Ovako/>

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