Material data sheet
Steel grade

Last revised: Tue, 07 Feb 2023 13:34:11 GMT

100CrMnSi4-4 All

General Information

Ovako 831 is a through hardening bearing steel that is mainly used for medium sized martensitic hardened bearing components, but it can also be used for machine components that require high tensile strength and high hardness. Ovako 831 has a controlled Ni and Mo content for enhanced and consistent hardenability.

831B - Bearing quality (BQ) variant

- Through hardenability corresponding to a ring with approximately 20mm wall thickness (~Ø35mm bar)
- Can be induction or flame hardened
- Good machinability in soft annealed condition
- Very good dimensional stability

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

ASTM A485 grade 1/B2

Chemical composition

Variant	Cast		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
831B	IC	Min	0.92	0.50	1.05	-	0.005	1.00	0.10	0.06
		Max	1.02	0.70	1.20	0.015	0.015	1.15	0.25	0.10
EN ISO 683-17	Std	Min	0.93	0.45	0.90	-	-	0.90	-	-
		Max	1.05	0.75	1.20	0.025	0.015	1.20	-	0.10

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A_5 [%]	Hardness
831B	+SA	All formats	24 < 190	480	720 typical	28	210 HB typical

*$Rp_{0.2}$ * R_{eh}, ** R_{el}*

Transformation temperatures

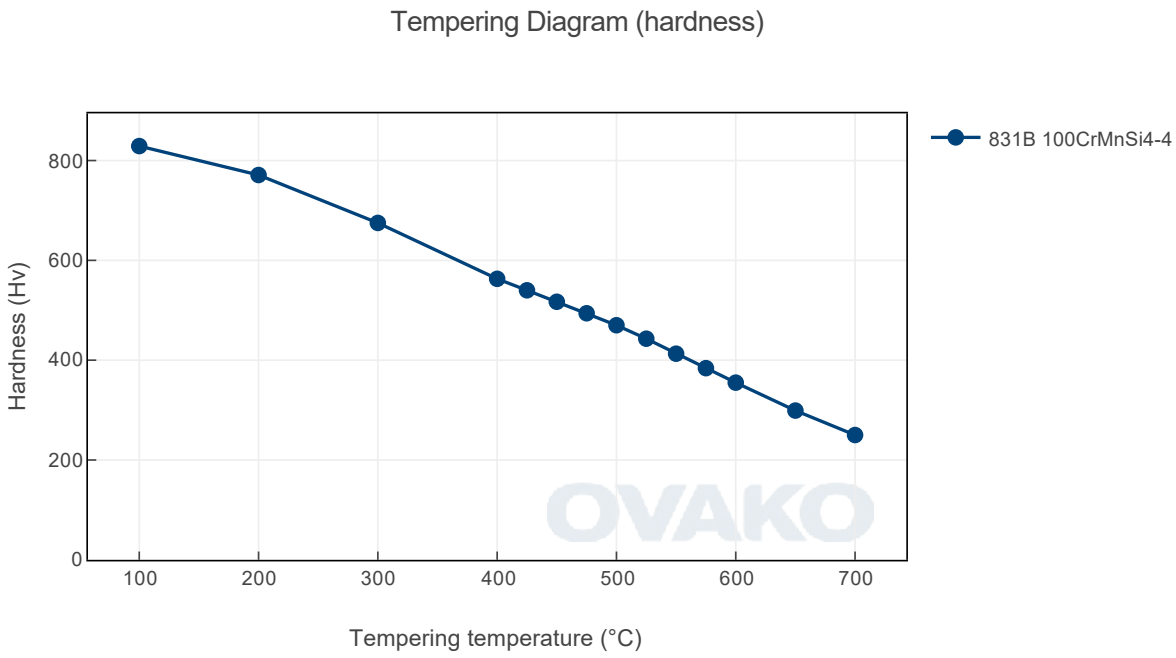
	Temperature °C
MS	236
AC1	750
AC3	750

Heat treatment recommendations

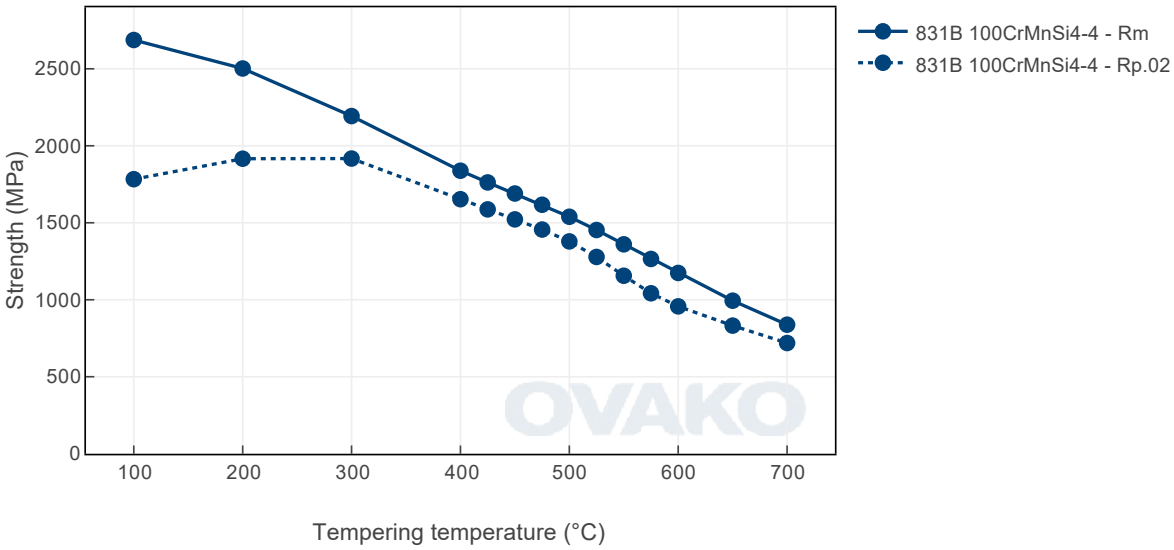
Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1100°C	In air
Spheroidize annealing	+SA	RT-810°C 1h, 810°C 2h, 810-740°C 1h, 740-650°C 10h	In air
Q/T (martensite)	+Q/T(m)	830-870°C 10-60min	In oil (temper within 2h)
Tempering	+T	160-500°C	In air

Heat Treatment Guide generated Graphs

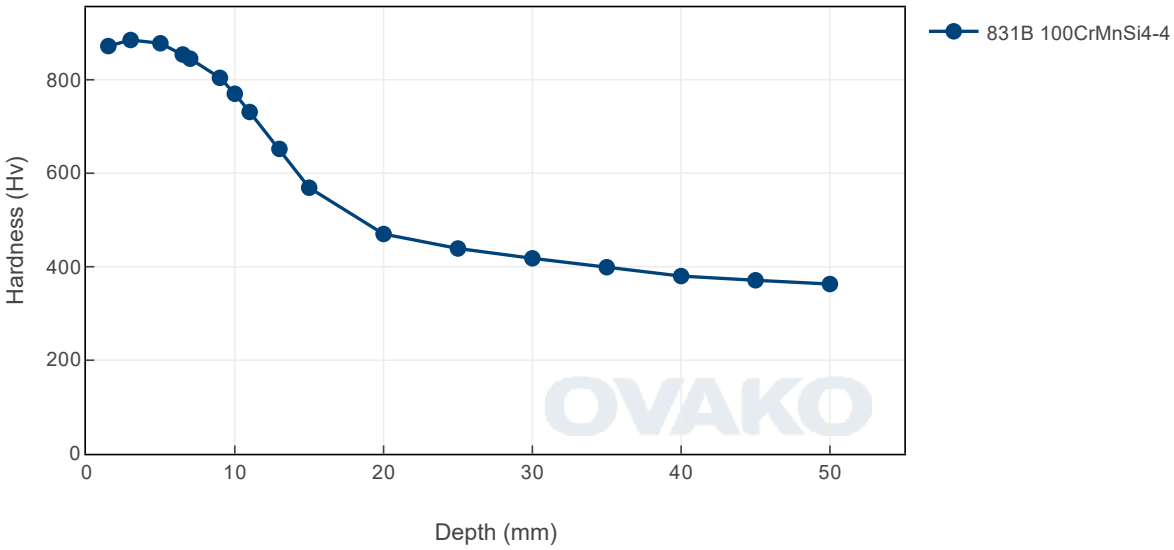
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



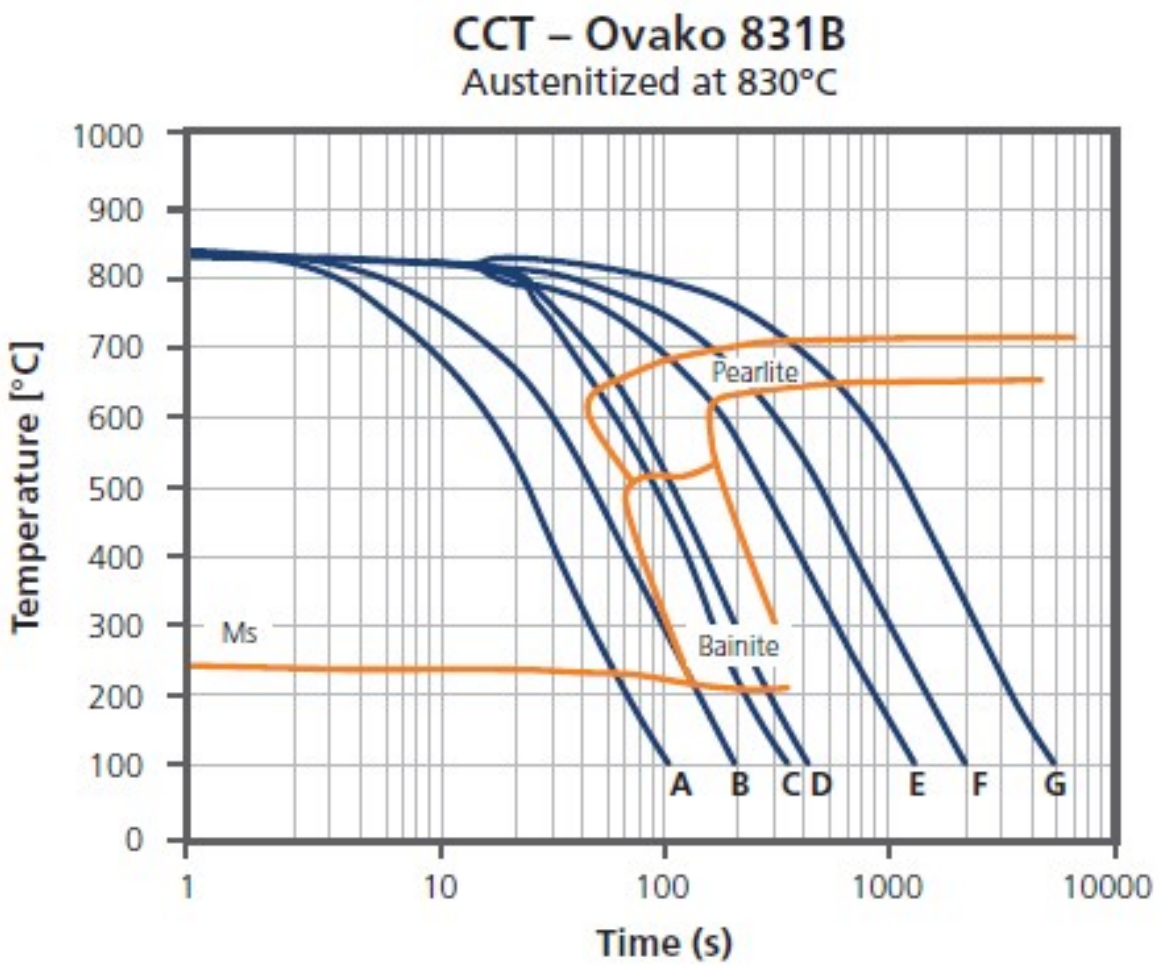
Tempering Diagram (strength)



Jominy


831B 100CrMnSi4-4
Hardness (Hv)
800
600
400
200
0
0
10
20
30
40
50
Depth (mm)
OVAKO

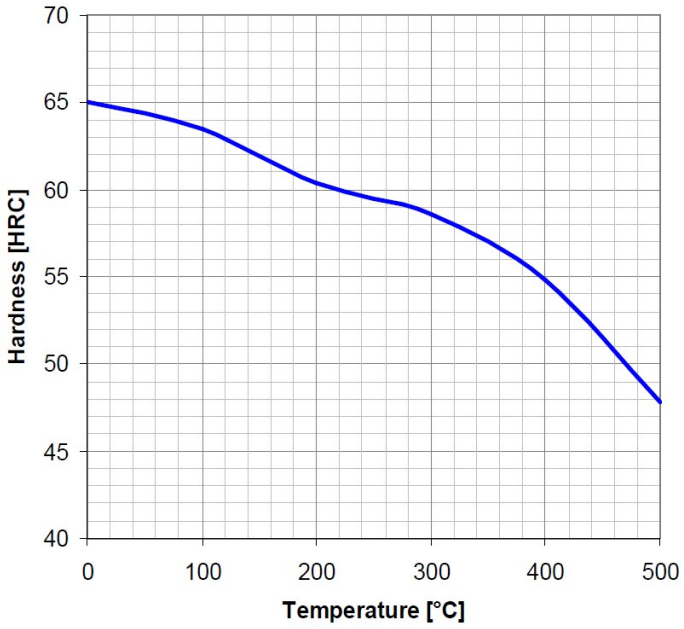
CCT



CCT data

	A	B	C	D	E	F	G
t_{8-5} [s]	25	50	80	100	300	500	1200
Hv_{30}	852	837	602	486	334	314	313

Tempering response



Tempering response for Ovako 831B. Austenitized at 830°C for 20 min and quenched in oil. Tempered one hour at each tested temperature level

Steel cleanliness

Micro inclusions - Ovako 831B									Macro inclusions - Ovako 831B	
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		Limits	< 2,5 mm/dm^2
	Th	He	Th	He	Th	He	Th	He		
	2,0	1,5	0,8	0,1	0	0	0,5	0,3		

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_2 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
CO2e/kg	120	62	76

To get the full picture of our products environmental impact we have to look at all of our CO_2 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	Scope 1-3 (CO2e kg /1000 kg steel)	Climate compensated Net emission = Scope 3 (CO2e kg /1000 kg steel) Scope 1 - 2 = 0 (compensated)
831B	Round bar	+SA	612	216
831B	Tube,wall	+SA	637	235

As of 1 January 2022 we use carbon offset for all our scope 1- 2 emissions, so in practice the climate compensated data is the same as the full Scope 3 level.
All above data are to be seen as typical values for the specified format and condition. Detailed information about your specific product please contact your sales contact.

Other properties (typical values)

Youngs module (GPa)	Poisson´s ratio (-)	Shear module (GPa)	Density (kg/m3)
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 resistivityAmbient 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:

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