

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 |

Mechanical Properties

| Variant | Condition ⁱ | 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 |

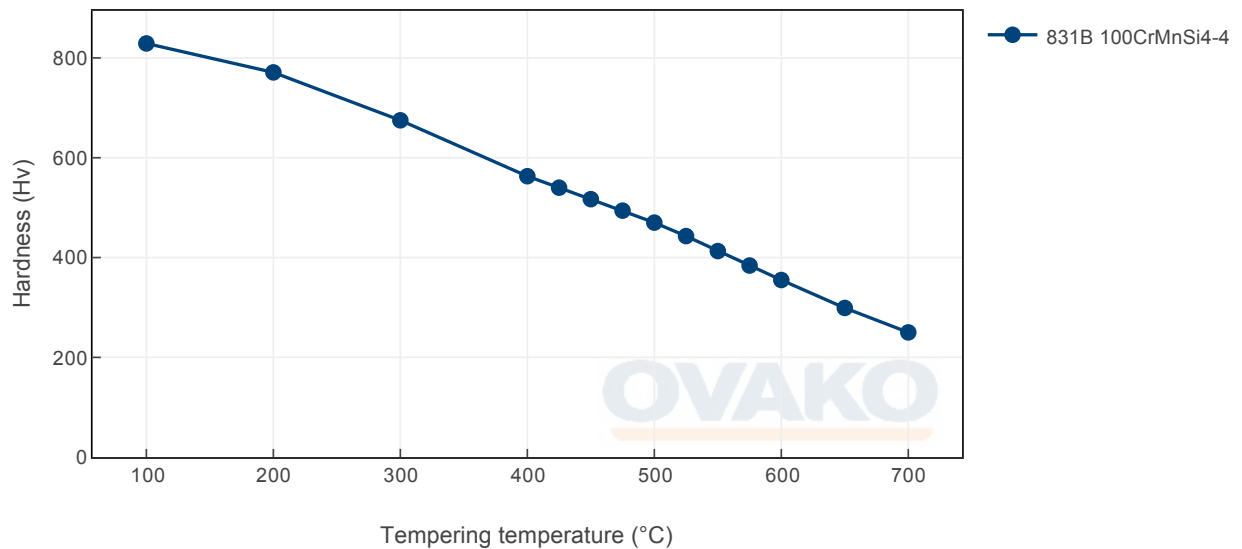
Heat treatment recommendations

| Treatment | Condition ⁱ | 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 |

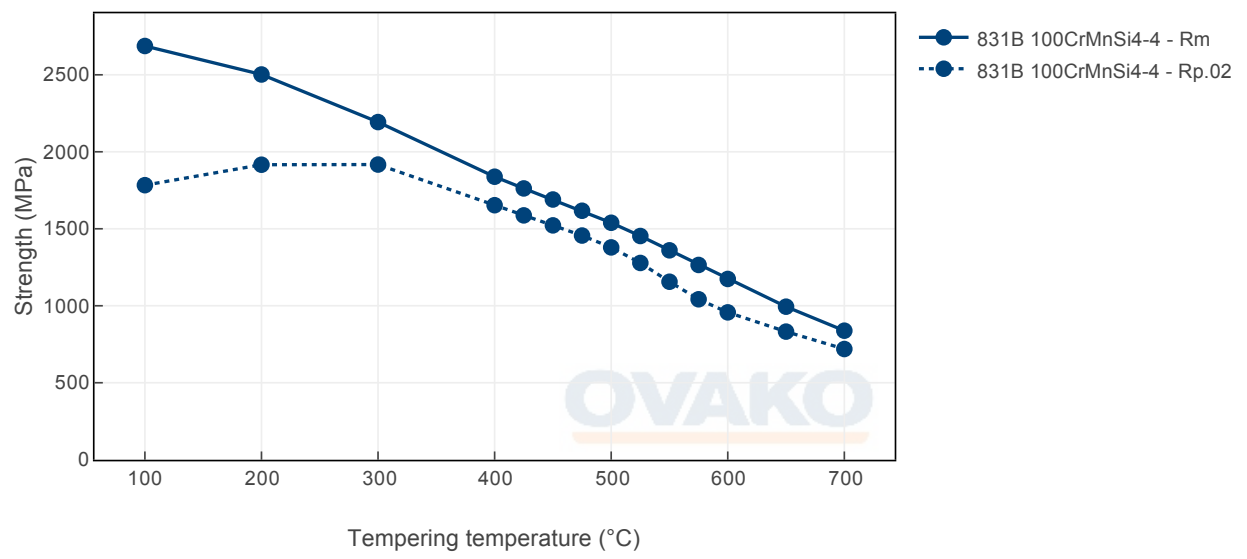
Heat Treatment Guide generated Graphs

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.

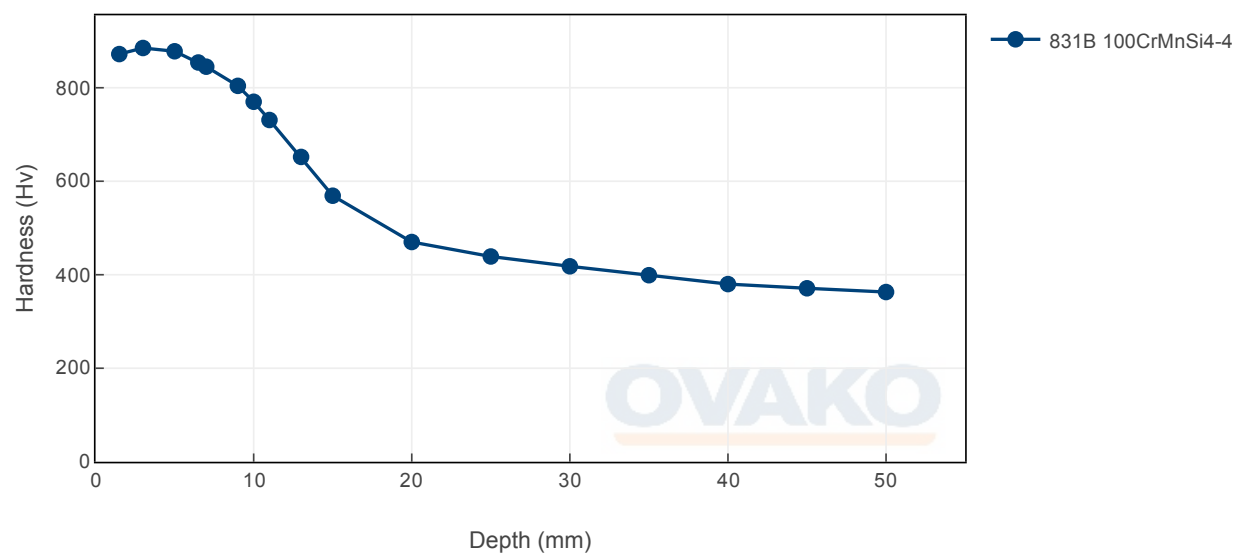
Tempering Diagram (hardness)

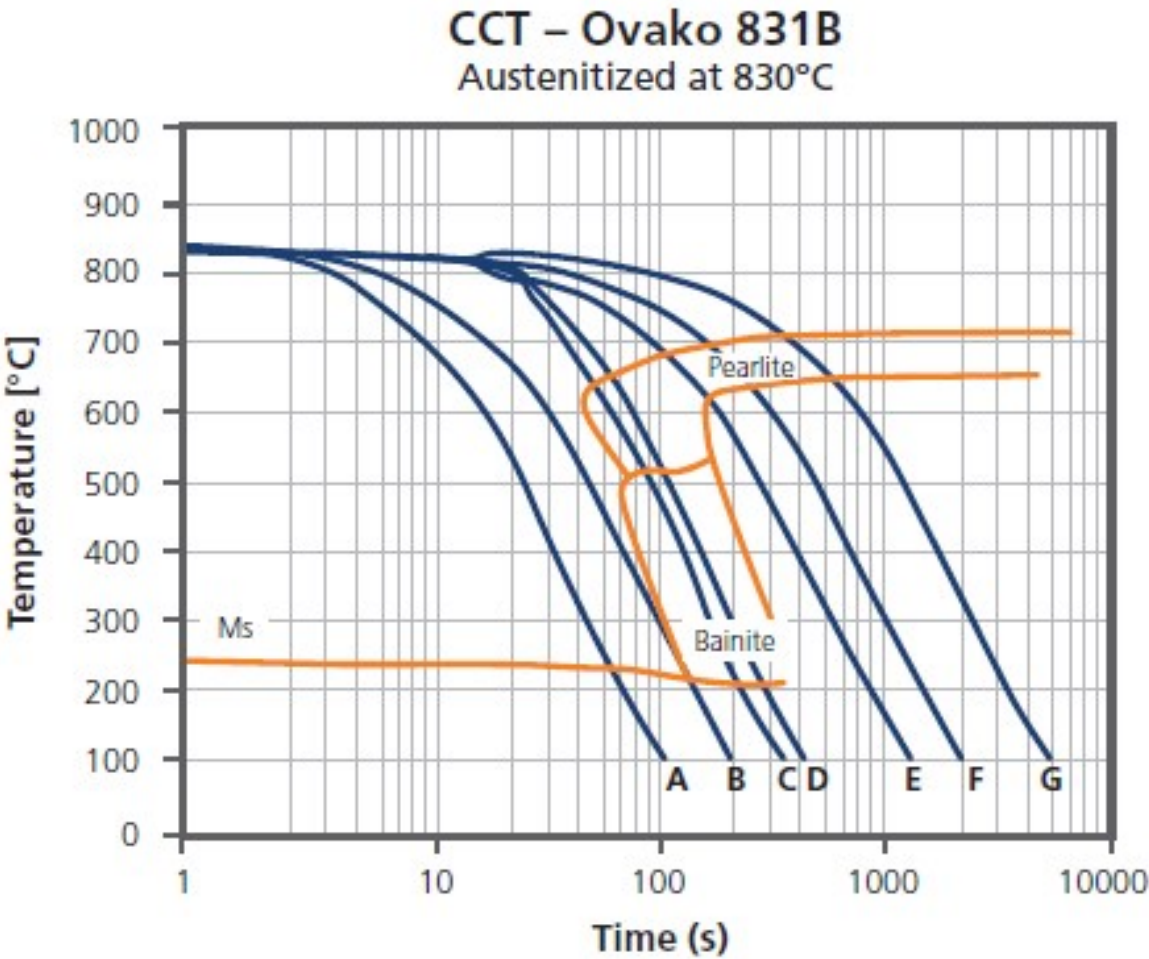


Tempering Diagram (strength)



Jominy

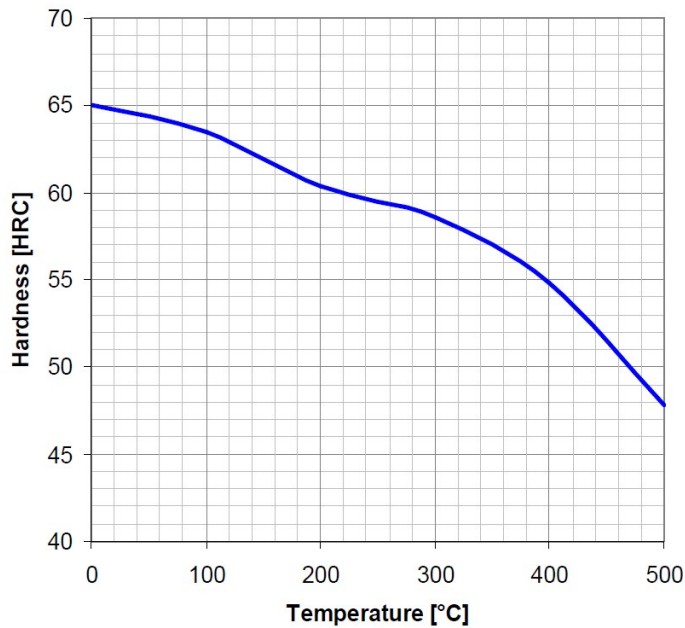




CCT data

| | 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 | A | | B | | C | | D | Limits | < 2,5 mm/dm ² |
| limits | Th | He | Th | He | Th | He | Th | | |
| | 2,0 | 1,5 | 0,8 | 0,1 | 0 | 0 | 0,5 | | |

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 CO₂ 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 ₂ e/kg | 120 | 62 | 76 |

To get the full picture of our products environmental impact we have to look at all of our CO₂ 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 (CO ₂ e kg /1000 kg steel) | Climate compensated Net emission = Scope 3 (CO ₂ e 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 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

Via telephone: +46 8 622 1300

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

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