

## STEEL GRADE

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**100CrMnMoSi8-4-6** All**General Information**

Ovako 827 is a through hardening bearing steel that is mainly used for medium sized bearing rings, but it can also be used for machine components that require high tensile strength, hardness and toughness.

827B - Bearing quality (BQ) variant

- Through hardenability corresponding to a ring with approximately 75mm wall thickness ( $\approx \varnothing 130$ mm bar), quenched in oil
- Suitable for martensitic or bainitic hardening
- Good machinability in soft annealed condition
- 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 B8

**Chemical composition**

| Variant       | Cast |     | C %  | Si % | Mn % | P %   | S %   | Cr % | Ni % | Mo % |
|---------------|------|-----|------|------|------|-------|-------|------|------|------|
| 827B          | IC   | Min | 0.93 | 0.40 | 0.90 | -     | 0.003 | 1.85 | -    | 0.50 |
|               |      | Max | 0.98 | 0.60 | 1.10 | 0.025 | 0.008 | 2.05 | 0.25 | 0.60 |
| EN ISO 683-17 | Std  | Min | 0.93 | 0.40 | 0.80 | -     | -     | 1.80 | -    | 0.50 |
|               |      | Max | 1.05 | 0.60 | 1.10 | 0.025 | 0.015 | 2.05 | -    | 0.60 |

## Mechanical Properties

| Variant | Condition <sup>i</sup> | Format      | Dimension [mm] | Yield strength min [MPa] | Tensile strength [MPa] | Hardness       |
|---------|------------------------|-------------|----------------|--------------------------|------------------------|----------------|
| 827B    | +SA                    | All formats | 30 < 190       | -                        | -                      | 220 HB typical |
|         | +Q/T(m)                | Ring, wall  | < 75           | 1700                     | 2300 typical           | 61 HRC typical |
|         | +Q/T(b)                | Ring, wall  | < 75           | 2000                     | 2200 typical           | 59 HRC typical |

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

## Transformation temperatures

|     | Temperature °C |
|-----|----------------|
| MS  | 233            |
| AC1 | 750            |
| AC3 | 750            |

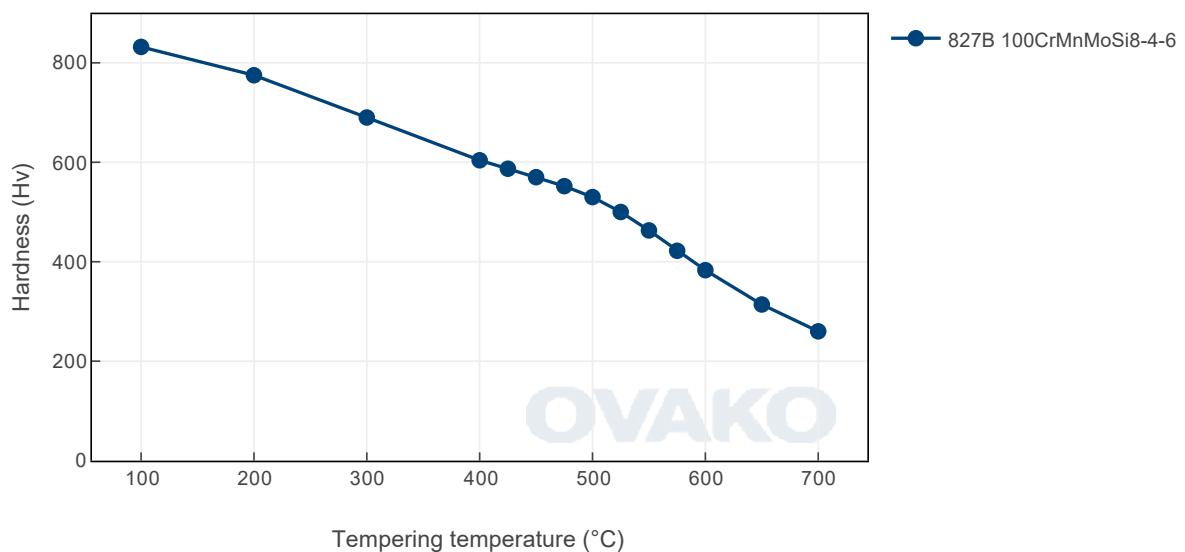
## Heat treatment recommendations

| Treatment                | Condition <sup>i</sup> | Temperature cycle  | Cooling/quenching                         |
|--------------------------|------------------------|--|---|
| Hot forging              | +U                     | 850-1100C  | In air                                    |
| Normalizing              | +N                     | 880-910C   | In air                                    |
| Spheroidize annealing    | +SA                    | *Normalizing is recommended prior to Soft Annealing, RT-820C 1-2h, 820C 2-5 h, 820-740C 1h, 740-690C 16h | In air                                    |
| Stress relieve annealing | +SRA                   | 550-650C 2h  | In air                                    |
| Q/T (martensite)         | +Q/T(m)                | 830-880C 20-60min  | In oil ( temper within 2h )               |
| Q/T (bainite)            | +Q/T(b)                | 850-880C 20-60min  | Salt bath 220-250C 10-20h ( see diagram ) |
| Tempering                | +T                     | 160-500C 1-3h  | In air                                    |

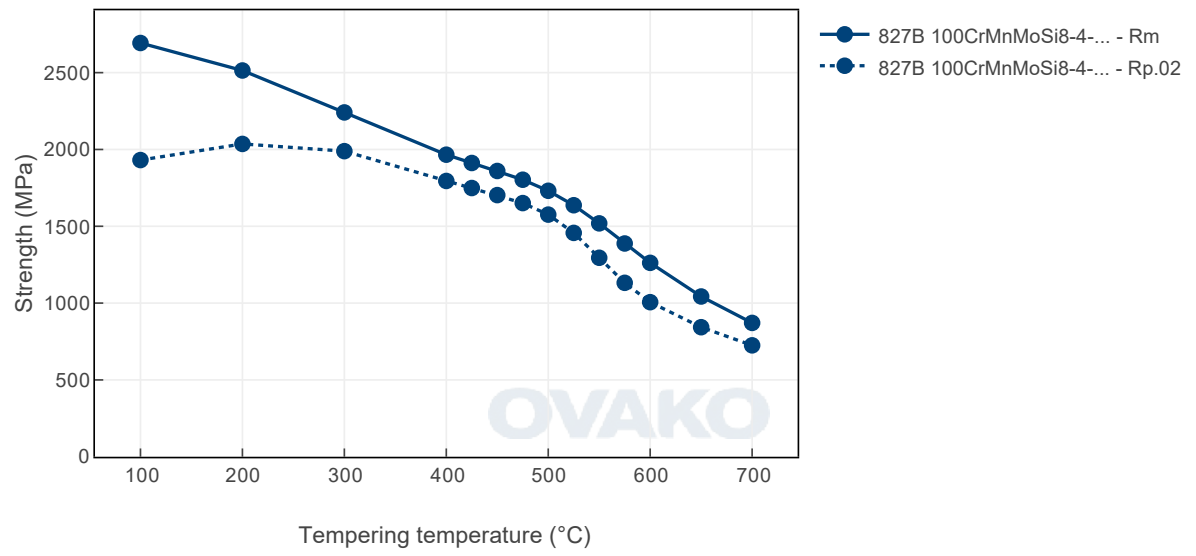
## Heat Treatment Guide generated Graphs

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.

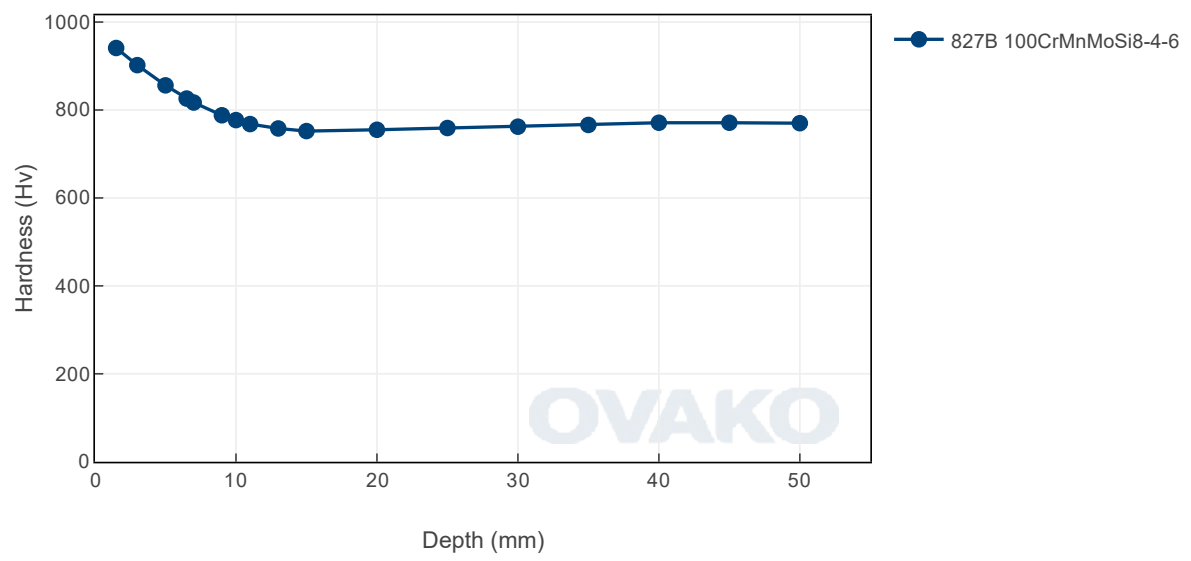
Tempering Diagram (hardness)



Tempering Diagram (strength)



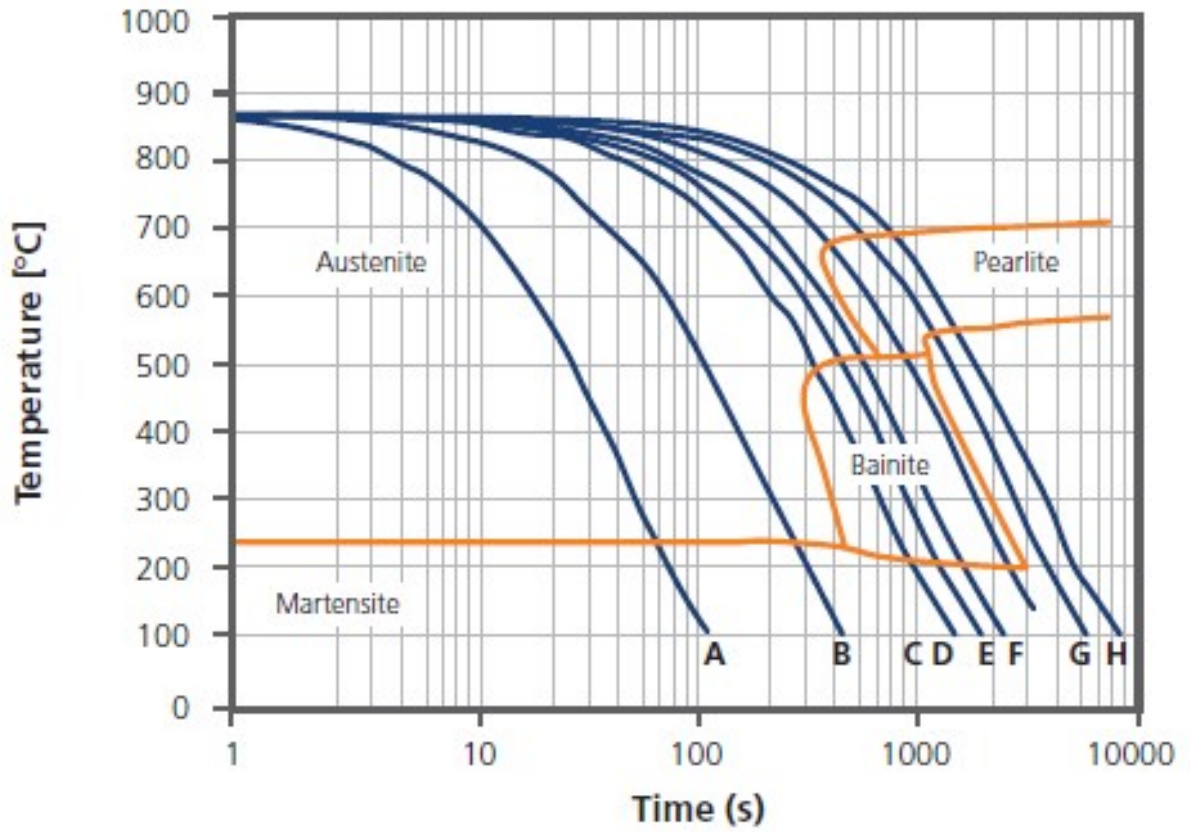
# Jominy





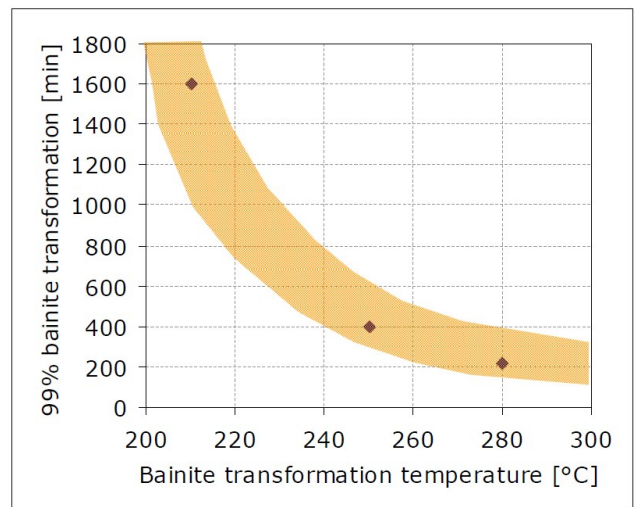
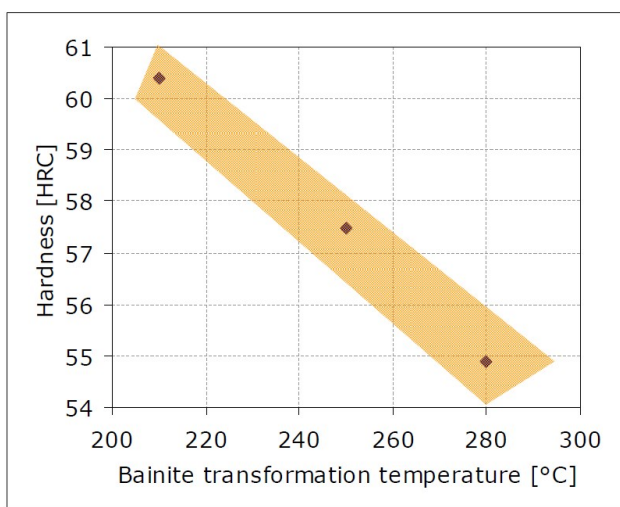
CCT

Austenitized at 870°C for 45 minutes



|                  | A   | B   | C   | D   | E   | F   | G    | H    |
|------------------|-----|-----|-----|-----|-----|-----|------|------|
| $t_{0.5}$ [s]    | 25  | 100 | 300 | 400 | 500 | 800 | 1200 | 1600 |
| Hv <sub>30</sub> | 862 | 856 | 726 | 706 | 533 | 463 | 423  | 392  |

Bainite transformation



## Steel cleanliness

| Micro inclusions - Ovako 827B |           |     |     |     |    |    |     | Macro inclusions - Ovako 827B |                                |
|-------------------------------|-----------|-----|-----|-----|----|----|-----|-------------------------------|--------------------------------|
| Applied standard              | ASTM E45  |     |     |     |    |    |     | Applied standard              | ISO 3763<br>(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](#).

| 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 ⓘ | 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) |
|-------------|-----------|-------------|---|--|
| 827B        | Round bar | +SA         | 685   | 284  |
| 827B        | Tube,wall | +SA         | 712   | 314  |

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/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:

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Via telephone: +46 8 622 1300

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

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