

# 100CrMo7-4 All

## General Information

Ovako 826 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.

826B - Bearing quality (BQ) variant

- Through hardenability corresponding to a ring with approximately 50mm wall thickness ( $\approx\varnothing 80$ 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 B7, 1.3538

## Chemical composition

| Variant       | Cast |     | C %  | Si % | Mn % | P %   | S %   | Cr % | Ni % | Mo % |
|---------------|------|-----|------|------|------|-------|-------|------|------|------|
| 826B          | IC   | Min | 0.93 | 0.25 | 0.60 | -     | 0.005 | 1.65 | -    | 0.40 |
|               |      | Max | 1.05 | 0.35 | 0.80 | 0.025 | 0.015 | 1.95 | 0.25 | 0.50 |
| EN ISO 683-17 | Std  | Min | 0.93 | 0.15 | 0.60 | -     | -     | 1.65 | -    | 0.40 |
|               |      | Max | 1.05 | 0.35 | 0.80 | 0.025 | 0.015 | 1.95 | -    | 0.50 |

## Mechanical Properties

| Variant | Condition ⓘ | Format      | Dimension [mm] | Yield strength min [MPa] | Tensile strength [MPa] | Hardness       |
|---------|-------------|-------------|----------------|--------------------------|------------------------|----------------|
| 826B    | +SA         | All formats | 30 < 190       | -                        | -                      | 180-220 HB     |
|         | +Q/T(m)     | Ring, wall  | < 50           | 1700                     | 2300 typical           | 61 HRC typical |
|         | +Q/T(b)     | Ring, wall  | < 50           | 2000                     | 2200 typical           | 59 HRC typical |

$R_{p0.2}$  \*  $R_{eh}$ , \*\*  $R_{el}$

## Transformation temperatures

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

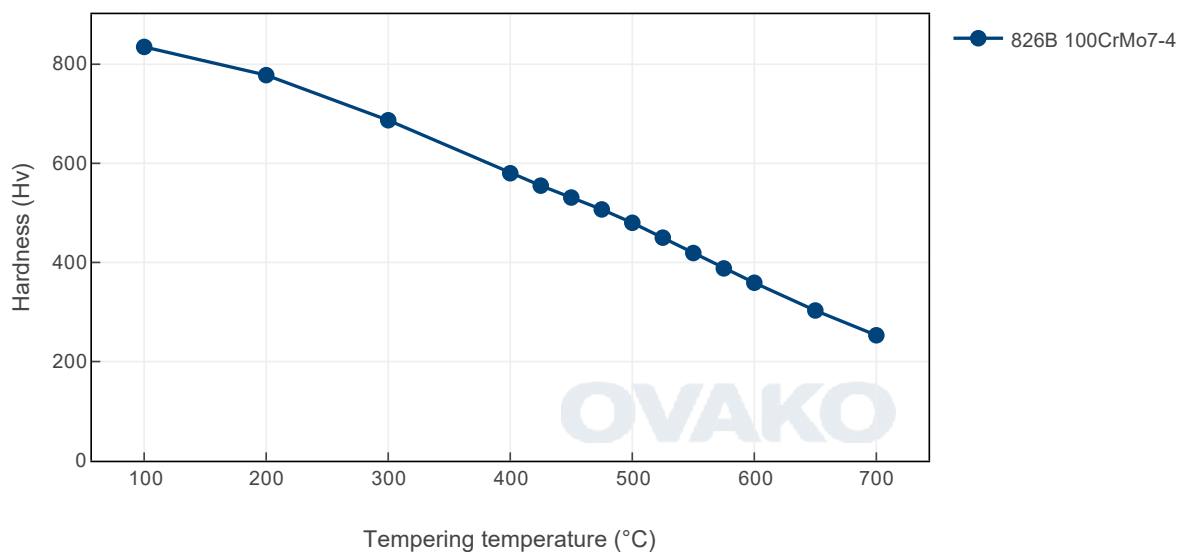
## Heat treatment recommendations

| Treatment                | Condition ⓘ | Temperature cycle  | Cooling/quenching           |
|--------------------------|-------------|--|-----------------------------|
| Hot forging              | +U          | 800-1100C  | In air                      |
| Normalizing              | +N          | 880-910C   | In air                      |
| Soft annealing           | +SA         | *Normalizing is recommended prior to Soft Annealing, RT-820C 1-2h, 820C 2-5h, 820-740C 1h, 740-690C 12h, | 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                   |
| Tempering                | +T          | 160-500C   | In air                      |

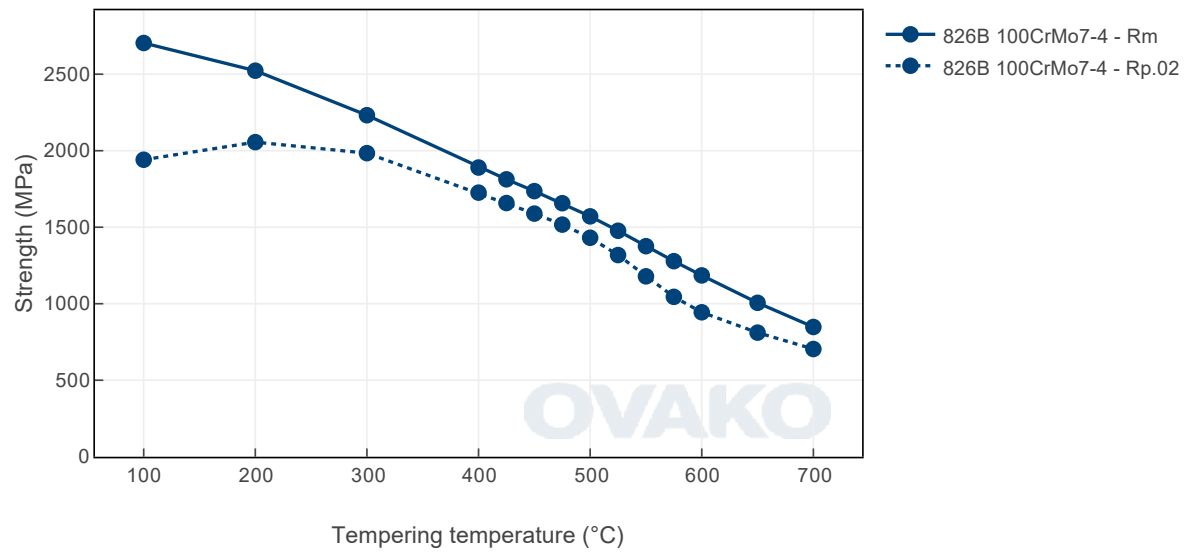
## Heat Treatment Guide generated Graphs

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.

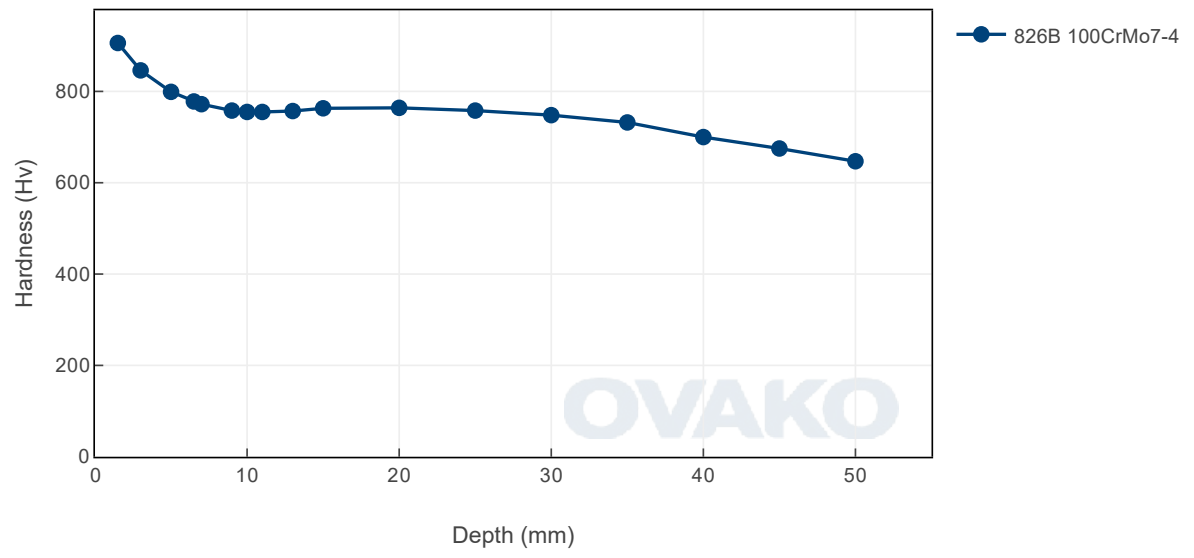
Tempering Diagram (hardness)



Tempering Diagram (strength)

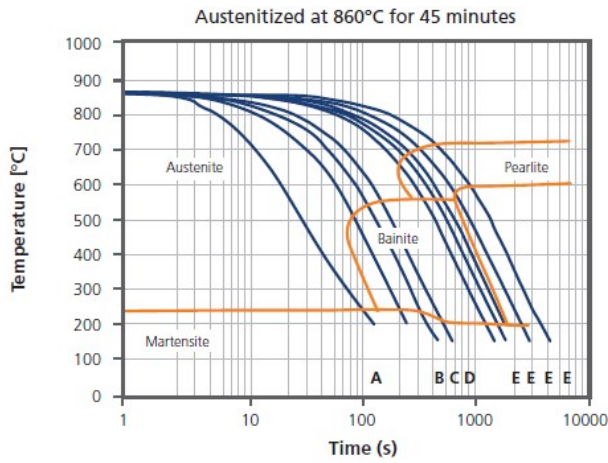


# Jominy





## CCT



|                  | A   | B   | C   | D   | E   | F   | G   | H    |
|------------------|-----|-----|-----|-----|-----|-----|-----|------|
| $t_{0-5}$ [s]    | 25  | 80  | 120 | 170 | 400 | 590 | 800 | 1200 |
| Hv <sub>30</sub> | 860 | 813 | 647 | 500 | 428 | 406 | 385 | 336  |

## Steel cleanliness

| Micro inclusions - Ovako 826B |           |     |     | Macro inclusions - Ovako 826B |                                 |    |     |
|-------------------------------|-----------|-----|-----|-------------------------------|---------------------------------|----|-----|
| 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  |
|                               | 2,0       | 1,5 | 0,8 | 0,1                           | 0                               | 0  | 0,5 |
| 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 | 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) |
|-------------|------------|-----------|---|--|
| 826B        | Round bar  | +SA       | 643   | 247  |
| 826B        | Tube, wall | +SA       | 670   | 268  |

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/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](mailto:info@ovako.com)

Via telephone: +46 8 622 1300

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

### Disclaimer

*The information in this document is for illustrative purposes only. The data and examples are only general recommendations and not a warranty or a guarantee. The suitability of a product for a specific application can be confirmed only by Ovako once given the actual conditions. The purchaser of an Ovako product has the responsibility to ascertain and control the applicability of the products before using them. Continuous development may necessitate changes in technical data without notice. This document is only valid for Ovako material. Other material, covering the same international specifications, does not necessarily comply with the properties presented in this document.*