Material data sheet
# Steel grade

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OVAKO

# 100CrMnSi6-4 All

### General Information

Ovako 837 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.

- 30 mm maximum wall thickness for through hardening
- Used for martensitic hardening
- Can be induction hardened
- Good machinability in soft annealed condition
- Machinable in hardened condition using hard-turning techniques (CBN tools)
- Very good dimension stability

837R - Bearing quality (BQ) variant

837S - Variant with a controlled high sulphur content for enhanced low speed machining

5625 / 837Z - A continous cast variant (BQ)

### 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 B3, 100 CM 6

### Chemical composition

| Variant | Cast | | C% | Si% | Mn% | P% | S% | Cr% | Ni% | Mo% |
|---|---|---|---|---|---|---|---|---|---|---|
| 5625 / 837Z | CC | Min | 0.93 | 0.50 | 1.00 | - | - | 1.40 | - | - |
| | | Max | 1.05 | 0.70 | 1.20 | 0.025 | 0.008 | 1.65 | 0.30 | 0.10 |

## Mechanical Properties

| Variant | Condition | Format | Dimension [mm] | Hardness |
|---|---|---|---|---|
| 5625 / 837Z | +AR | Round bar | 40 < 120 | < 400 HB |
| | +A | Round bar | 40 < 120 | 180-220 HB |

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

## Transformation temperatures

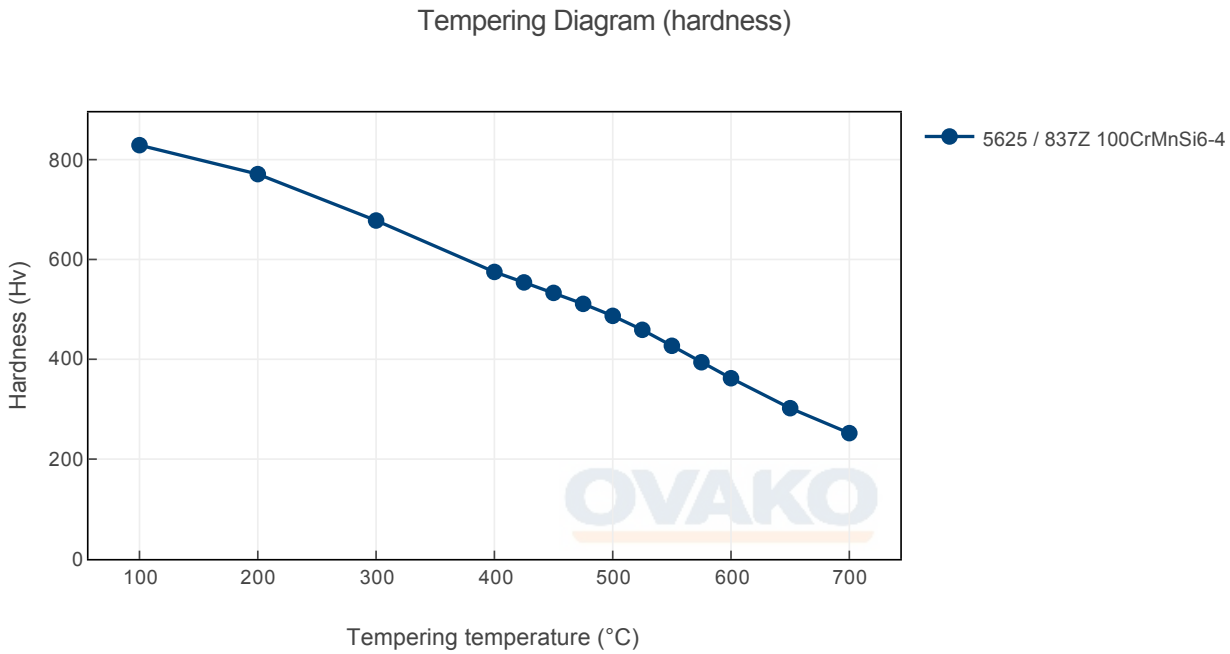
| | Temperature °C |
|---|---|
| MS | 229 |
| AC1 | 750 |
| AC3 | 750 |

## Heat treatment recommendations

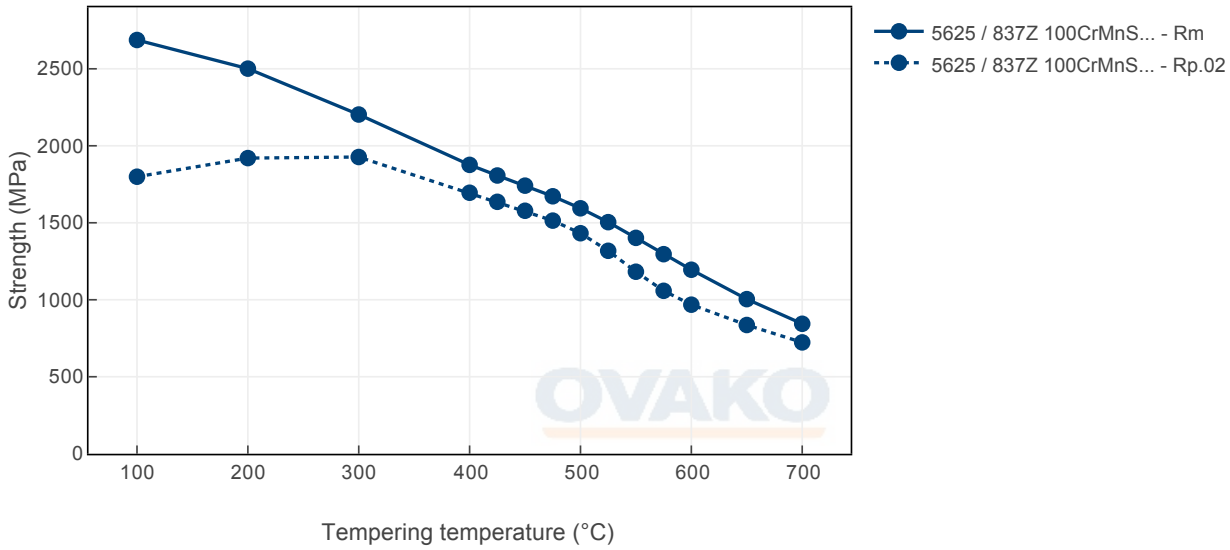
| Treatment | Condition | Temperature cycle | Cooling/quenching |
|---|---|---|---|
| Hot forging | +U | 800-1100C | In air |
| Normalizing | +N | 880-910C | In air |
| Spheroidize annealing | +SA | RT-810°C 1h, 810°C 2h, 810-740°C 1h, 740-650°C 10h | In air |
| Stress relieve annealing | +SRA | 550-650C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

## Heat Treatment Guide generated Graphs

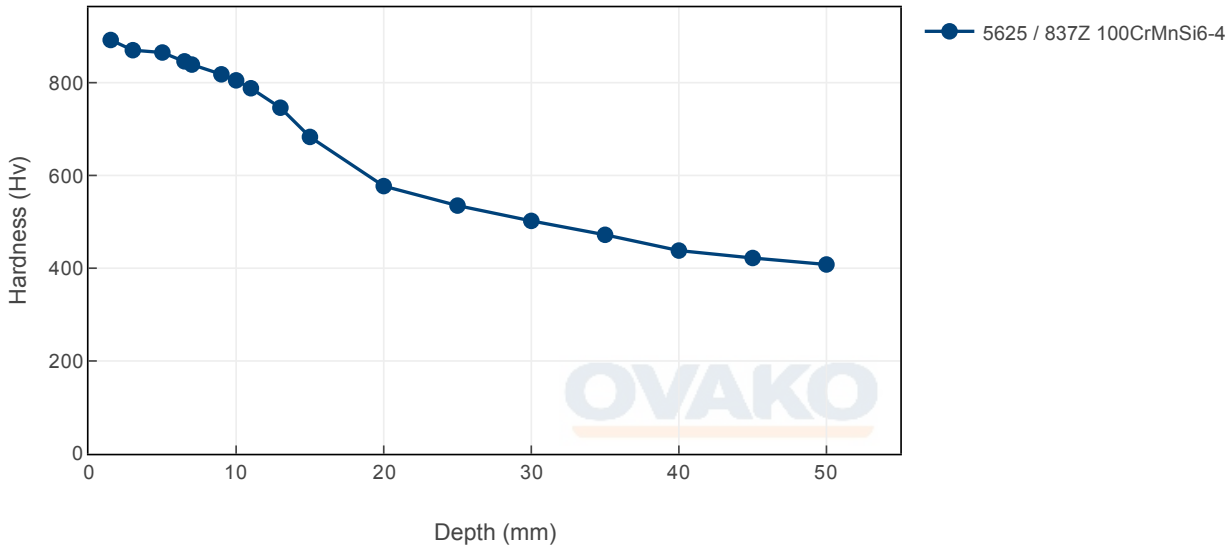
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



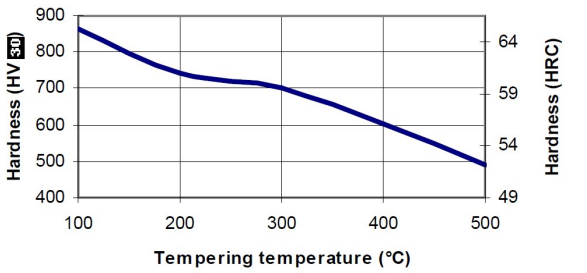
## Tempering Diagram (strength)



Jominy


Hardness (Hv)
800
600
400
200
0
0
10
20
30
40
50
Depth (mm)
5625 / 837Z 100CrMnSi6-4

## Tempering response




Tempering response for Ovako 837R. Austenitized at 850°C for 30min and quenched in oil. Tempered one hour at each tested temperature level

## Steel cleanliness

| Micro inclusions - Ovako 837R | | | | | | | | | | Macro inclusions - Ovako 837R | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | | 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) |
|---|---|---|---|---|
| 837 | Round bar | +SA | 617 | 221 |
| 837 | Tube,wall | +SA | 641 | 239 |
| 5625 / 837Z | Round bar | +SA | 572 | 269 |

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## 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/

## Disclaimer