MATERIAL DATA SHEET

# STEEL GRADE

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OVAKO

# 20MnCrNiMo4-2-2* All

## General Information

20MnCrNiMo4-2-2* or 8720 as it is also named in US standards, is a case hardening steel used in forgings to eg rock drilling tools.

For additional Heat Treatment Data, please visit the Heat Treatment Guide.

** Designation followed by "*" is not an official EN standard grade but named according to the rules in EN 10027.*

## Similar designations

AISI 8720

## Chemical composition

| Variant | Cast | Di | | C % | Si % | Mn % | P % | S % | Cr % | Ni % | Mo % | Cu % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4524 | CC | | Min | 0.20 | 0.20 | 0.78 | 0.000 | 0.000 | 0.57 | 0.58 | 0.21 | 0.00 |
| | | | Max | 0.22 | 0.30 | 0.90 | 0.020 | 0.015 | 0.65 | 0.65 | 0.25 | 0.25 |
| 4766 | CC | 3 | Min | 0.19 | 0.20 | 0.80 | 0.000 | 0.000 | 0.45 | 0.45 | 0.40 | 0.00 |
| | | | Max | 0.23 | 0.35 | 1.00 | 0.025 | 0.015 | 0.65 | 0.65 | 0.55 | 0.25 |
| 152E | IC | | Min | 0.20 | 0.20 | 0.80 | 0.000 | 0.000 | 0.50 | 0.50 | 0.20 | 0.00 |
| | | | Max | 0.22 | 0.30 | 0.90 | 0.020 | 0.010 | 0.65 | 0.65 | 0.30 | 0.25 |
| 8720H | Std | | Min | 0.17 | 0.15 | 0.60 | - | - | 0.35 | 0.35 | 0.20 | - |
| | | | Max | 0.23 | 0.35 | 0.95 | - | - | 0.65 | 0.75 | 0.30 | - |

## Mechanical Properties

| Variant | Condition | Format | Dimension [mm] | Hardness |
|---|---|---|---|---|
| 4766 | +AR | Round bar | 25 < 160 | < 250 HB |

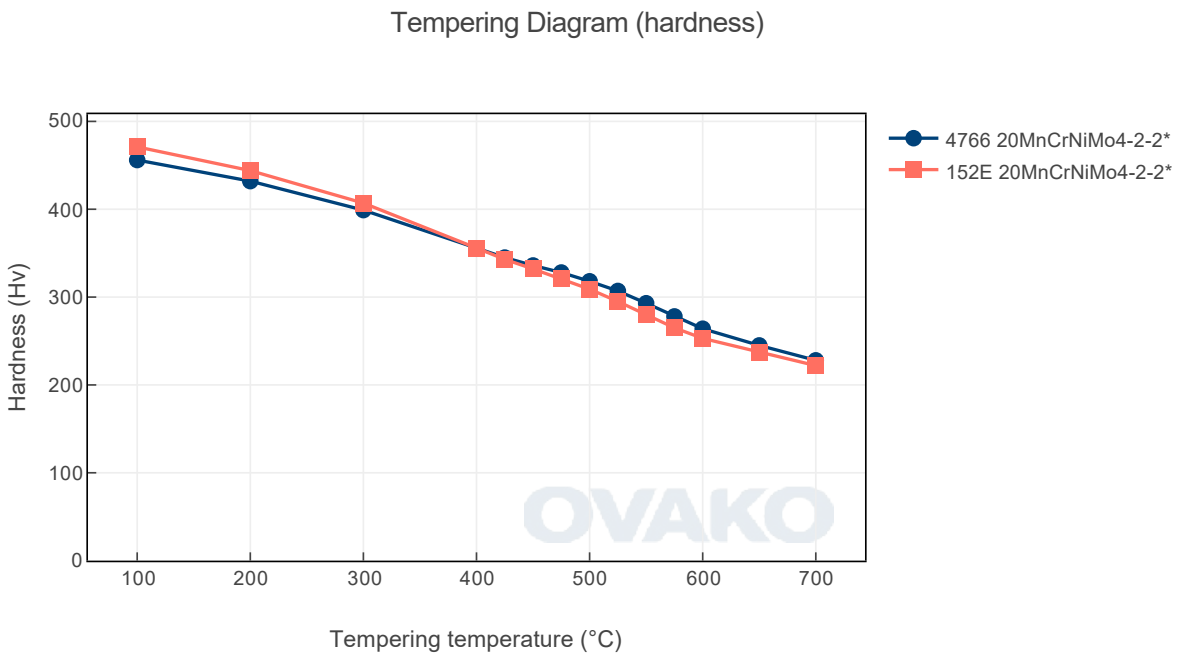
$Rp_{0.2}$ * $R_{eh}$, ** $R_{el}$

## Transformation temperatures

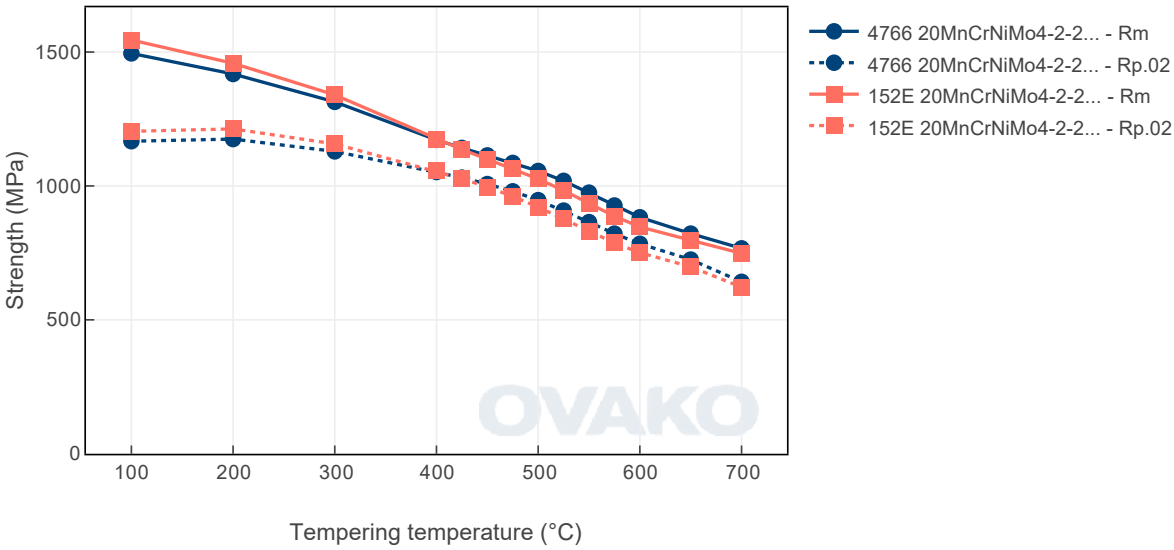
| | Temperature °C |
|---|---|
| MS | 397 |
| AC1 | 725 |
| AC3 | 828 |

## Heat Treatment Guide generated Graphs

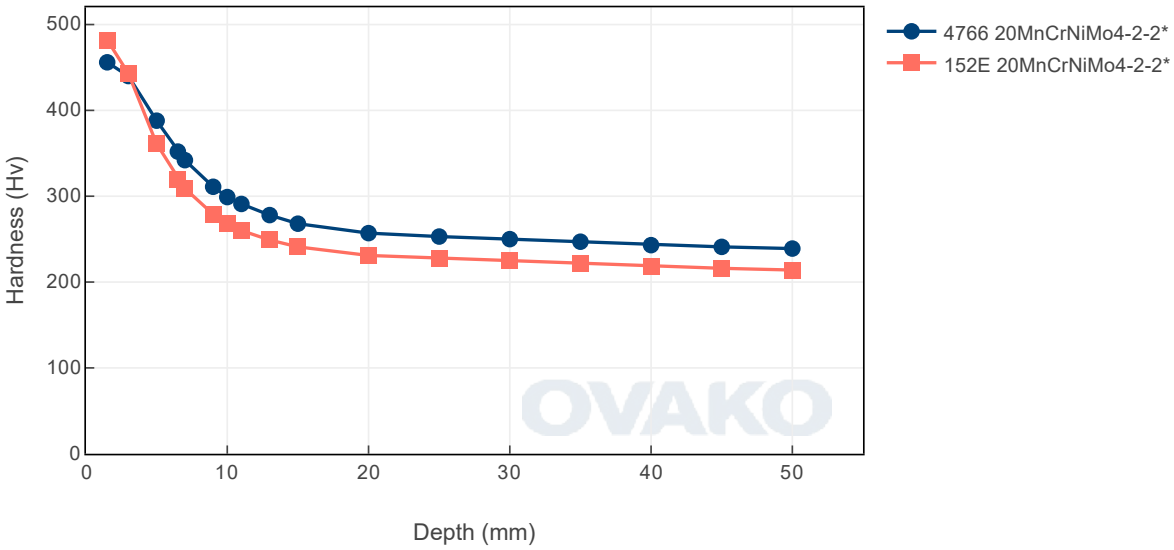
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



## Tempering Diagram (strength)



# Jominy


Hardness (Hv)
500
400
300
200
100
0
0
10
20
30
40
50
Depth (mm)
4766 20MnCrNiMo4-2-2*
152E 20MnCrNiMo4-2-2*
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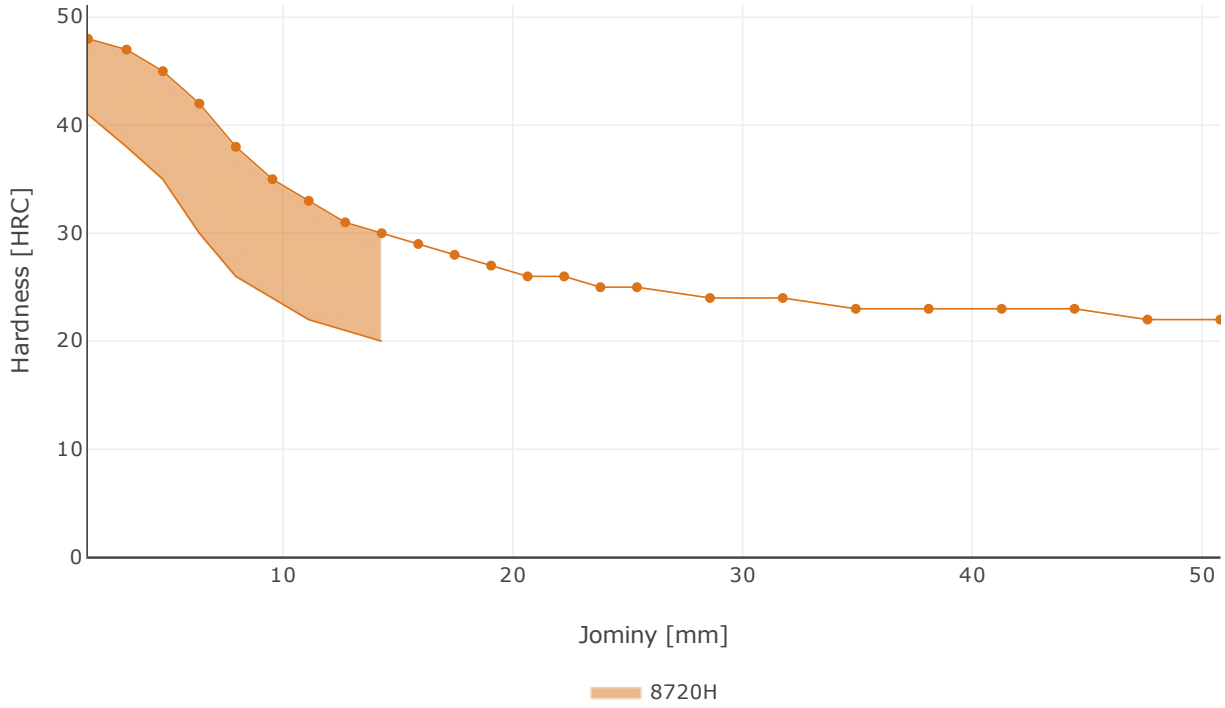
## Hardenability




## 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 |
|---|---|---|---|
| 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) |
|---|---|---|---|---|
| 152E | Round bar | +AR | 678 | 279 |
| 152E | Round bar | +FP | 683 | 282 |
| 152E | Tube,wall | +AR | 706 | 309 |
| 152E | Tube,wall | +FP | 709 | 311 |
| 4766 | Round bar | +AR | 616 | 312 |
| 4524 | Round bar | +AR | 609 | 307 |

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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Via telephone: +46 8 622 1300

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