

## 20MnCrS5 All

### General Information

Case-hardening steel with low carbon content but good hardenability reaching good wear resistance due to high surface hardness after hardening. The small grain size benefits in good ductility and fatigue strength. Suitable for gearboxes and axle gears.

### Similar designations

1.7149, SAE 5120, AISI 4820, 1.7147

### Chemical composition

Variant	Cast	Di	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Cu %	Al %
4324	CC	2.9	CEV 0.66 <sub>max</sub>	Min	0.17	0.15	1.00	-	0.025	1.00	0.10	0.05	-	0.017
			Pcm 0.34 <sub>max</sub>	Max	0.20	0.40	1.25	0.025	0.040	1.30	0.25	0.07	-	0.030
4326	CC		CEV 0.74 <sub>max</sub>	Min	0.18	-	1.10	-	0.030	1.25	0.10	0.04	-	0.020
			Pcm 0.42 <sub>max</sub>	Max	0.22	0.15	1.40	0.035	0.045	1.40	0.25	0.06	-	0.030
20MnCrS5 +H EN ISO 683-3	Std		CEV <sub>max</sub>	Min	0.17	0.15	1.10	-	0.020	1.00	-	-	-	-
			Pcm <sub>max</sub>	Max	0.22	0.40	1.40	0.025	0.040	1.30	-	-	0.40	-

## Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Hardness
4324	+AR	Round bar	25 < 160	< 270 HB
	+A	Round bar	25 < 160	< 180 HB
4326	+AR	Round bar	25 < 160	< 300 HB
	+A	Round bar	25 < 160	< 180 HB

$RP_{0.2}$  \*  $R_{eh}$  \*\*  $R_{el}$

## Transformation temperatures

	Temperature °C
MS	385
AC1	731
AC3	831

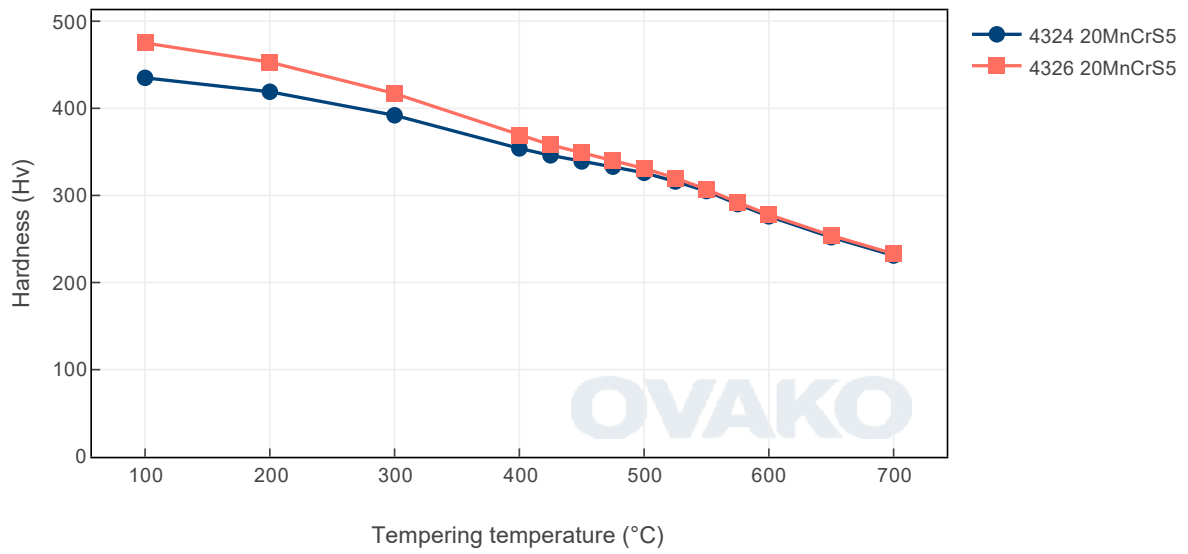
## Heat treatment recommendations

Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+AR	850-1200°C	Slowly or in air
Annealing	+A	670-710°C	Slowly (15°C/h) until 600°C
Annealing	+FP	630-650°C	Keeping about 3hrs, after that in air
Normalizing	+N	860-890°C	in air
Stress relieve annealing	+SRA	650-680°C	in air
Carburizing	+CA	860-900°C	in air
Hardening	+Q	830-870°C	Quenching in oil or water
Tempering	+T	150-200°C	in air

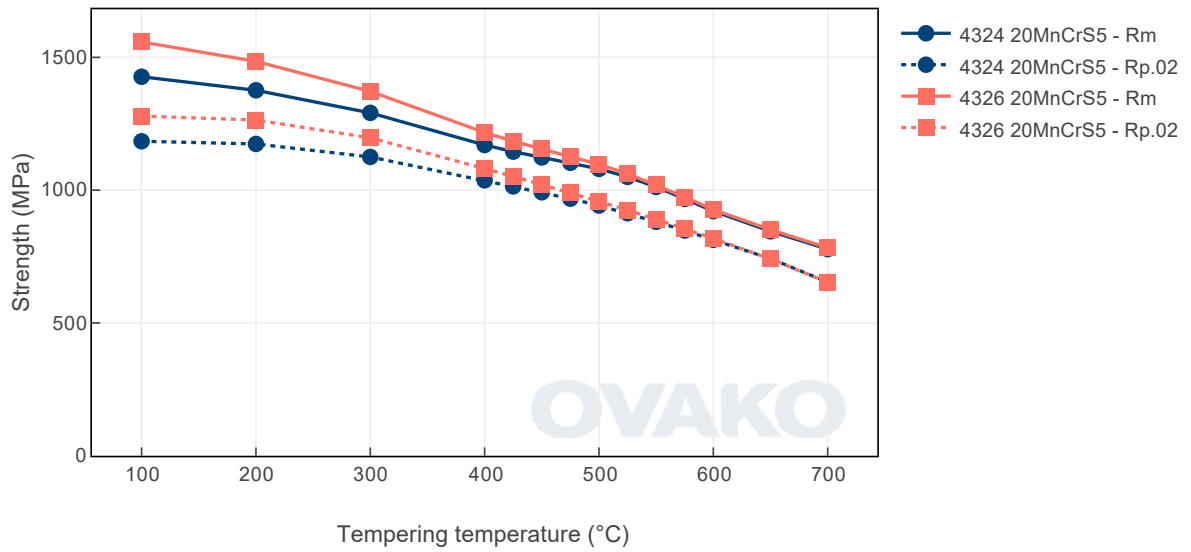
## Heat Treatment Guide generated Graphs

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.

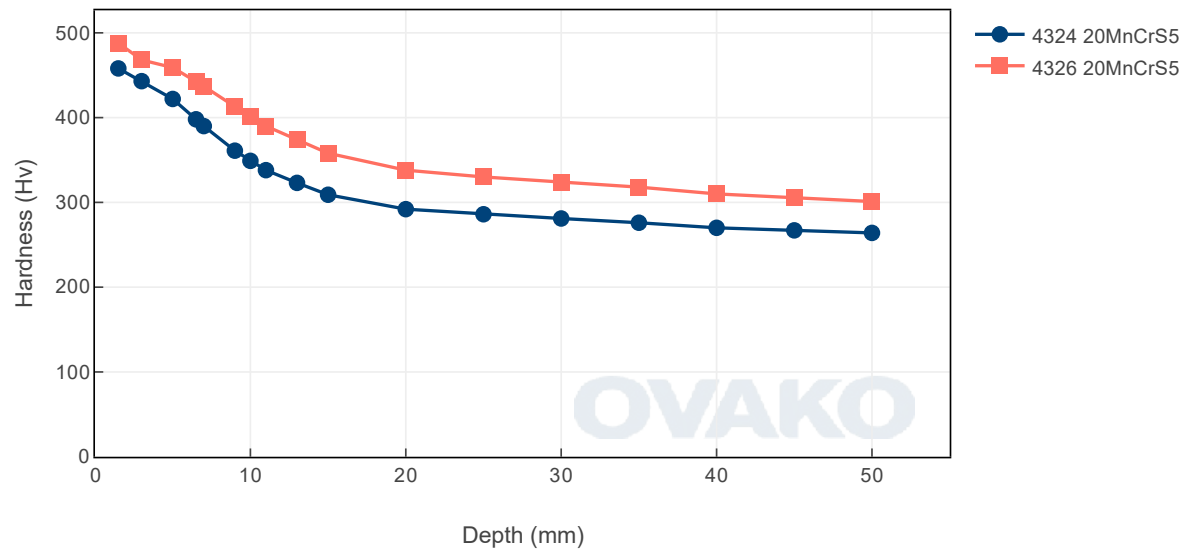
Tempering Diagram (hardness)



Tempering Diagram (strength)

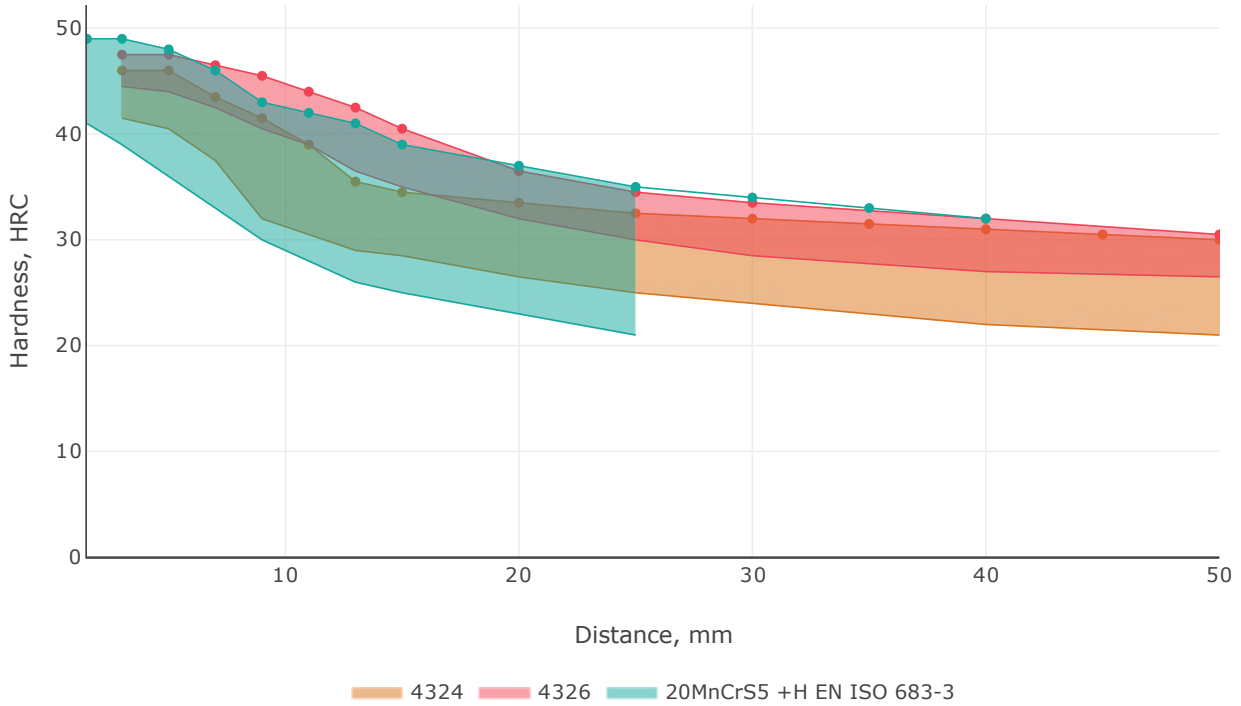


# Jominy





## 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<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 (CO2e kg /1000 kg steel)	Climate compensated Net emission = Scope 3 (CO2e kg /1000 kg steel) Scope 1 - 2 = 0 (compensated)
4324	Round bar	+AR	562	259
4326	Round bar	+AR	558	254

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](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.*