MATERIAL DATA SHEET

STEEL GRADE

Last revised: Wed, 04 Dec 2024 16:18:01 GMT

OVAKO

94CrMo5-2* All

General Information

Ovako 821L is a through hardening bearing steel intended for rolling contact and other high fatigued applications. In the hardened condition the high hardness, high strength and high cleanliness provides the steel with the right properties to withstand high cycle, high stress fatigue. Ovako 821L is mainly used for small and medium sized bearing components. It is also regularly used for other machine components that require high tensile strength and high hardness.

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

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

100Cr6, 52100, 100 C 6

Chemical composition

Variant	Cast		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
821L	IC	Min	0.94	0.10	0.25	-	-	1.30	-	0.20
		Max	1.00	0.15	0.45	0.015	0.010	1.50	0.15	0.23

Mechanical Properties

Variant	Condition	Format	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A_5 [%]	Hardness
821L	+SA	All formats	410	700 typical	27	195 HB typical
	+C	All formats	700	880 typical	13	290 HB typical
	+Q/T(m)	All formats	1700	2300 typical	2	61 HRC typical
	+Q/T(b)	All formats	2000	2200 typical	7	59 HRC typical

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

Transformation temperatures

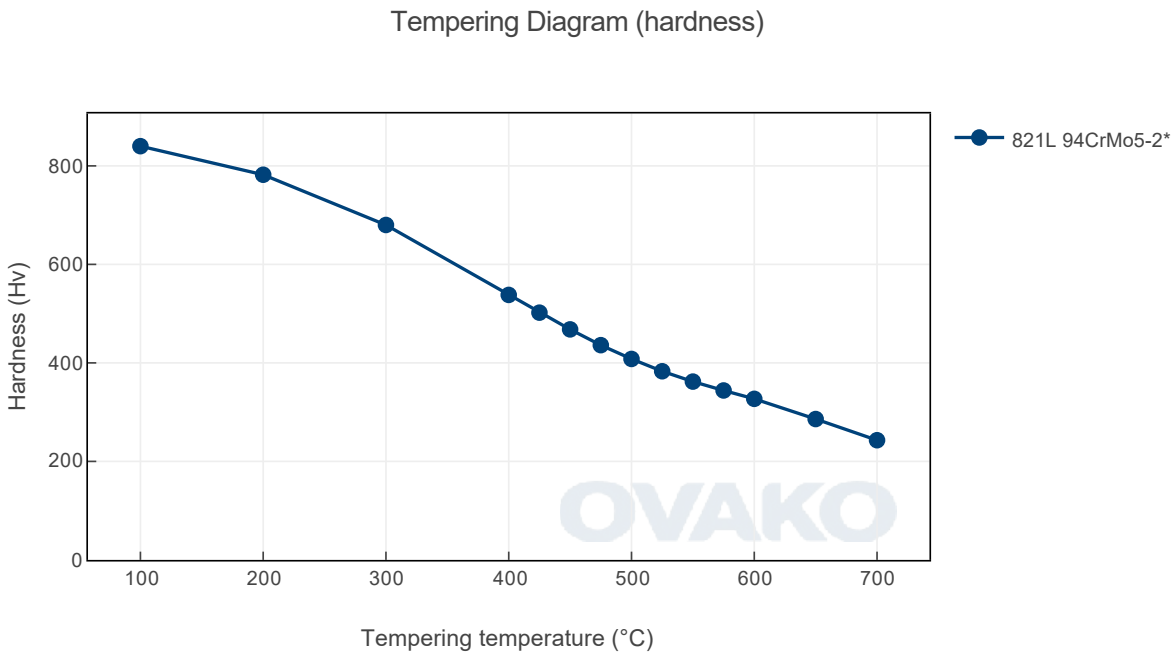
	Temperature °C
MS	115
AC1	750
AC3	750

Heat treatment recommendations

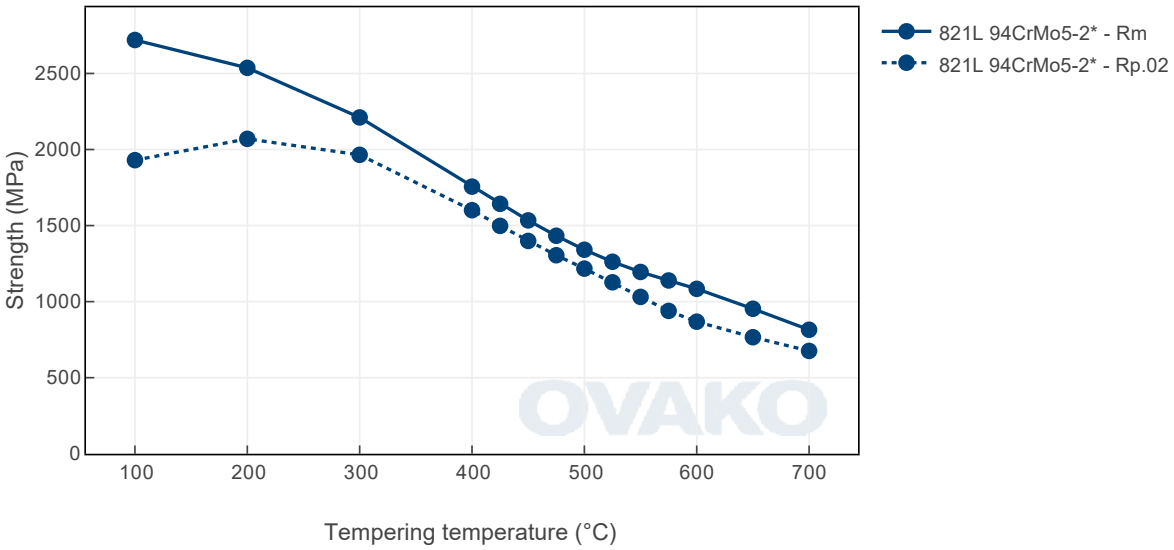
Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1100°C	In air
Spheroidize annealing	+SA	RT-820°C 1h, 820°C 2h, 820-740°C 1h, 740-690°C 10h	In air
Stress relieve annealing	+SRA	550-650°C	In air
Tempering	+T	160-500°C (see diagram)	In air
Q/T (martensite)	+Q/T(m)	830-870°C 10-60min	In oil (tempering within 2h) see diagram
Q/T (bainite)	+Q/T(b)	850-875°C 10-60min	Salt bath 220-250°C 3-7h (see diagram)

Heat Treatment Guide generated Graphs

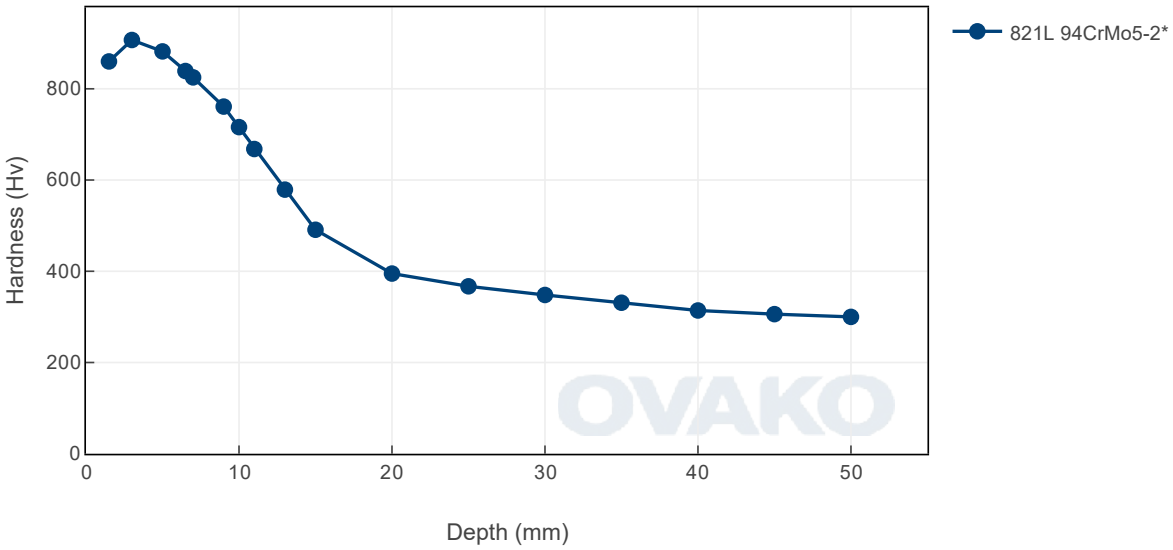
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



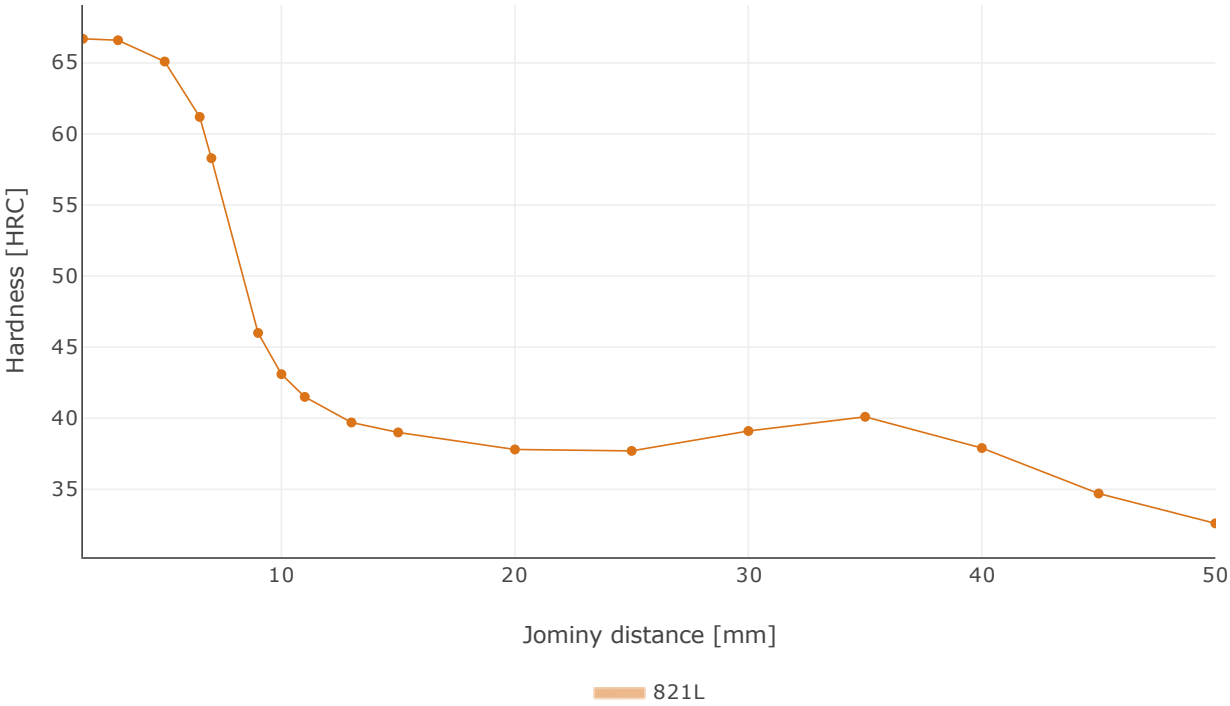
Tempering Diagram (strength)



Jominy

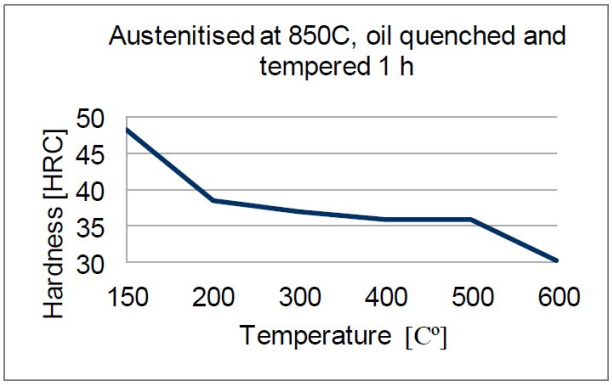

Hardness (Hv)
800
600
400
200
0
0
10
20
30
40
50
Depth (mm)
821L 94CrMo5-2*
OVAKO

Hardenability



Average value. Austenitized at 845°C

Tempering response



Tempering response after martensitic hardening

Steel cleanliness

Micro inclusions - BQ										Macro inclusions - BQ	
Applied standard	ASTM E45									Applied standard	ISO 3763 (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.

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)
821L	Round bar	+SA	612	211
821L	Tube,wall	+SA	633	236

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