MATERIAL DATA SHEET

STEEL GRADE

Last revised: Wed, 16 Jul 2025 07:52:32 GMT

OVAKO

100CrMo7 All

General Information

Ovako 824 is a through hardening bearing steels 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 824 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. The hardenability approximately corresponds to a ring with maximum 20 mm wall thickness. It is suitable for both martensitic and bainitic hardening. Ovako 824 comes in two variants. One Bearing Quality (BQ) variant that fulfills tough Ovako internal quality demands and consequently also the ISO 683-17 demands. One Isotropic Quality (IQ) with higher demands regarding micro inclusion cleanliness and improved isotropic properties. Additionally this variant has a slightly reduced carbon content to reduce the carbide segregation tendency. The IQ variant is especially suited for applications subjected to a complex loading mode.

824B - Bearing quality (BQ) variant

824P - Bearing quality (BQ) variant with low sulphur content

824Q - Isotropic quality (IQ) variant

IQ-Steel®
IQ-Steel® is an isotropic quality ultra clean steel optimized for high fatigue strength under multi axial loading.
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

100CD7, ASTM A485 grade 3, 1.3537

Chemical composition

Variant	Cast		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
824B	IC	Min	0.93	0.25	0.25	-	0.003	1.65	-	0.15
		Max	1.02	0.35	0.40	0.025	0.015	1.95	0.25	0.25
824P	IC	Min	0.93	0.25	0.30	-	0.003	1.80	-	0.15
		Max	0.98	0.35	0.40	0.025	0.008	1.95	0.25	0.25
824Q	IC	Min	0.92	0.25	0.25	-	-	1.80	-	0.15
		Max	1.00	0.35	0.40	0.020	0.001	1.95	0.25	0.25
EN ISO 683-17	Std	Min	0.93	0.15	0.25	-	-	1.65	-	0.15
		Max	1.05	0.45	0.45	0.025	0.015	1.95	-	0.30

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A_5 [%]	Hardness
824B	+SA	All formats	24 < 190	420	< 700	27	< 200 HB
	+Q/T(m)	Ring, wall	< 20	1700	< 2300	2	< 61 HRC
	+Q/T(b)	Ring, wall	< 20	2000	< 2200	7	< 59 HRC

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

Mechanical properties are valid for all steel grade variants

Transformation temperatures

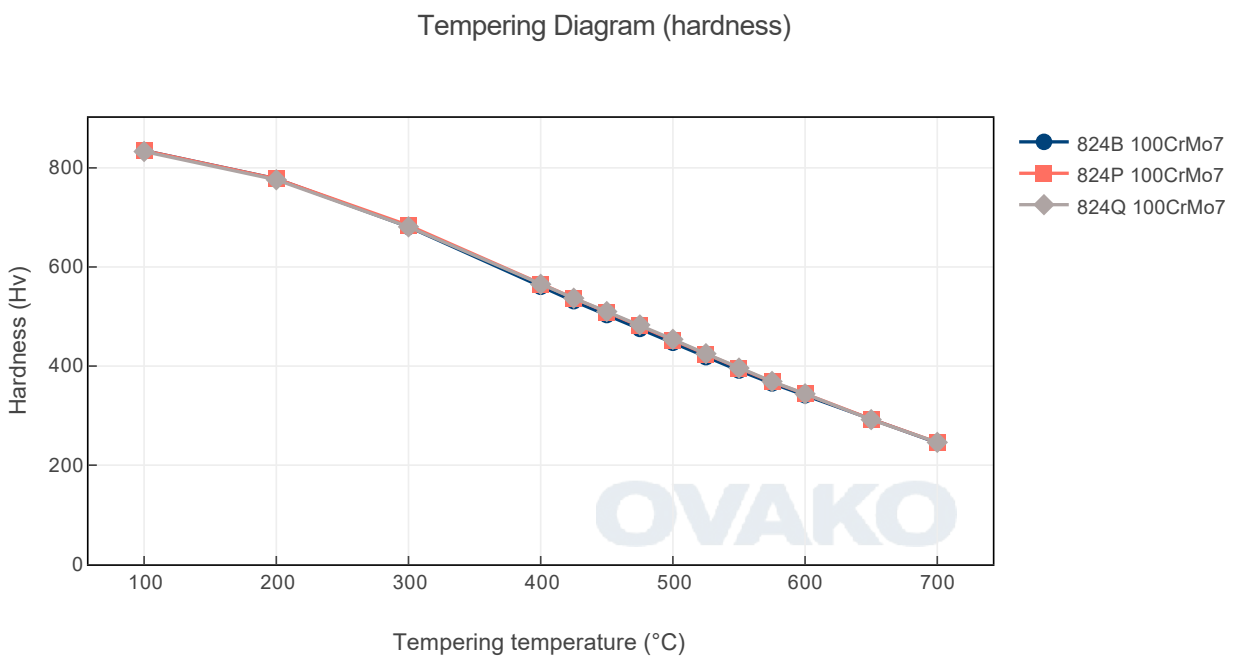
	Temperature °C
MS	186
AC1	750

Heat treatment recommendations

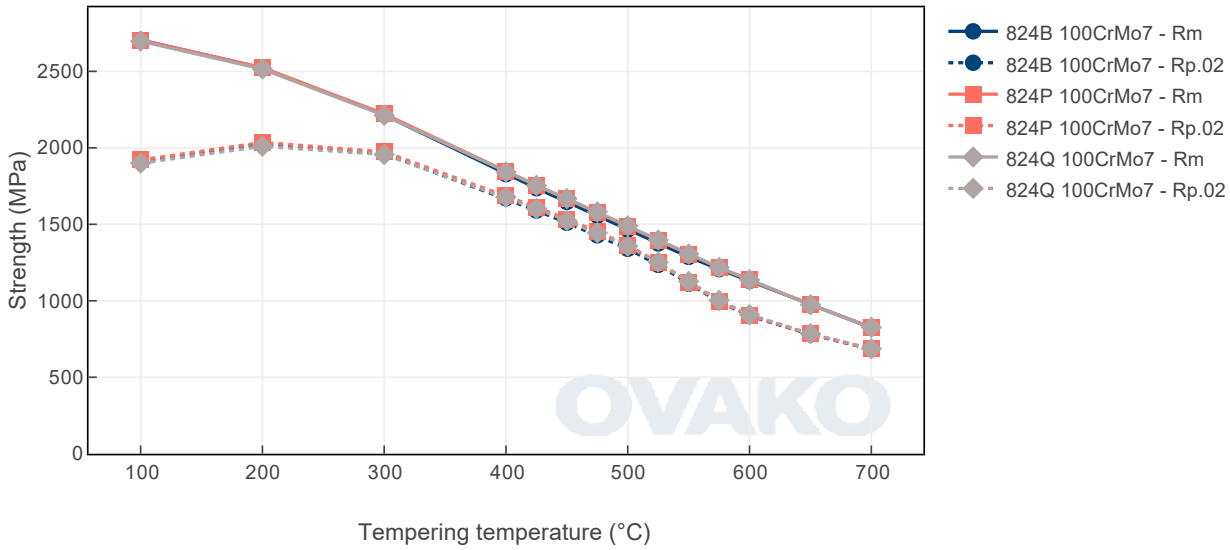
Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1100C	In air
Soft annealing	+SA	RT-820C 1h 820C 2h 820-740C 1h 740-690C 12h	In air
Stress relieve annealing	+SRA	550-650C 1h	In air
Q/T (martensite)	+Q/T(m)	830-870C 10-60 min	In oil. Temper within 2h
Q/T (bainite)	+Q/T(b)	850-875C 10-60 min	Salt bath 220-250C 3-8h
Tempering	+T	160-500C	In air

Heat Treatment Guide generated Graphs

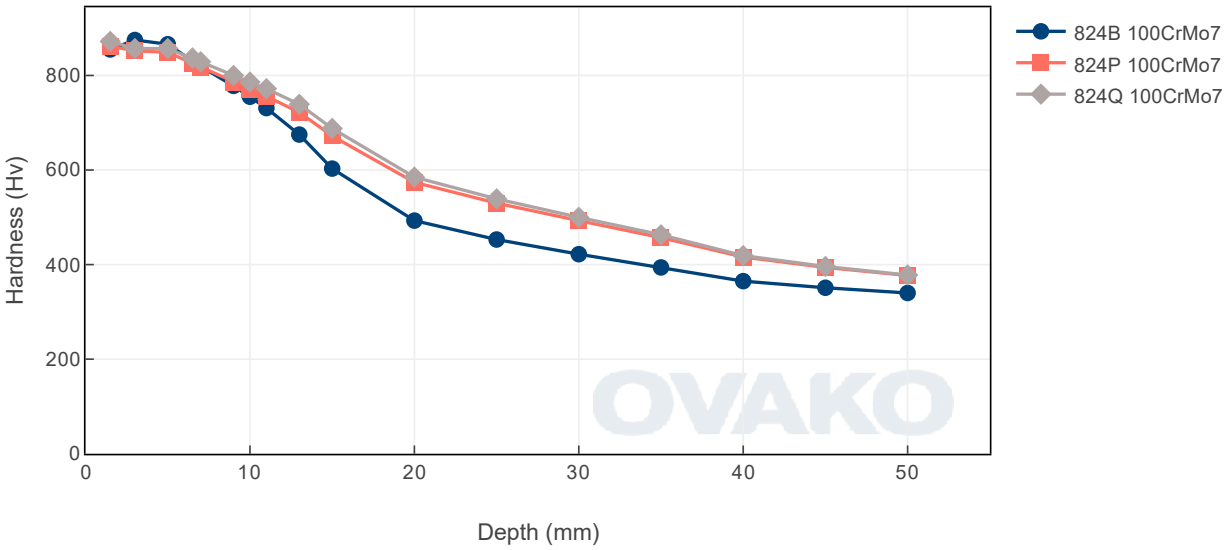
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



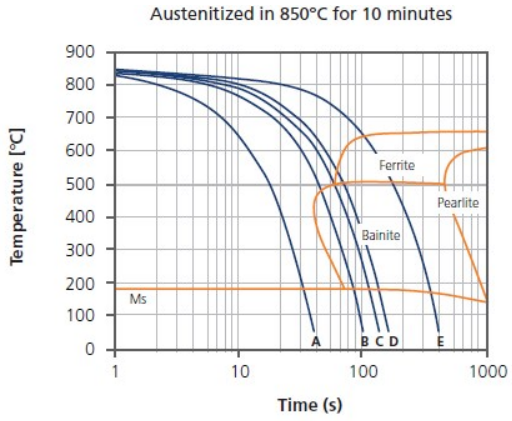
Tempering Diagram (strength)



Jominy


Hardness (Hv)
800
600
400
200
0
0
10
20
30
40
50
Depth (mm)
824B 100CrMo7
824P 100CrMo7
824Q 100CrMo7
OVAKO

CCT



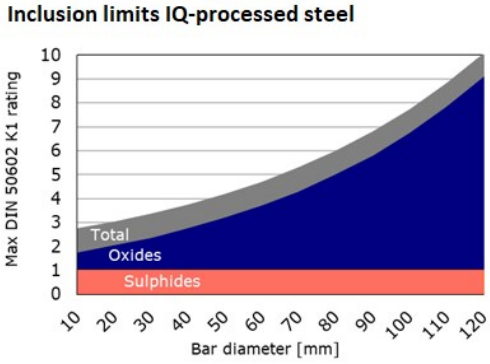
	A	B	C	D	E
t_{8-5} [s]	15	38	50	60	150
Hv_{30}	880	730	680	560	420

Steel cleanliness

Micro inclusions - Ovako 824B + 824P									**Macro inclusions - 824B + 824P**	
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		

Micro inclusions - IQ		**Macro inclusions - IQ**		
Applied standard	DIN 50602 K1	Applied standard	ISO 3763 (Blue fracture)	10 M Hz UST (Ovako internal procedure)
Sampling	Six random samples from final product dimension	Sampling	Statistical testing on billets	
Limits	The limit is dimension dependent. The average rating of six samples should not exceed the limits given in the graph	Limits	< 1 mm/dm^2	< 5 defects/dm^3 > 0,2 mm FBH

IQ



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)
824	Round bar	+SA	631
824	Tube,wall	+SA	654

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.

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/

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