MATERIAL DATA SHEET

STEEL GRADE

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OVAKO

24CrMo13-6 All

General Information

Ovako 420G is a through hardening alloy steel with god wear resistance in the as-rolled condition. It is also a good nitriding steel for enhanced wear resistance. Mainly used for drill rods.

- Good toughness
- Good dimensional stability
- Through hardenability corresponding to approximately 130 mm
- Delivered as rolled, soft annealed or QT

Similar designations

BS 722 M 24

Chemical composition

Variant	Cast	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %
420G	IC	CEV 1.21_{max}	Min	0.23	0.20	0.50	-	0.010	3.00	-	0.45	-
		Pcm 0.53_{max}	Max	0.25	0.35	0.60	0.020	0.025	3.50	0.03	0.60	0.050
EN ISO 683-5	Std	CEV $_{max}$	Min	0.20	-	0.40	-	-	3.00	-	0.50	-
		Pcm $_{max}$	Max	0.27	0.40	0.70	0.025	0.035	3.50	-	0.70	-

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A_5 [%]	Reduction of area Z_{min} [%]	Hardness	Impact (ISO-V) $strength_{min}$
420G	+A	All formats	25 < 130	-	-	-	-	230 HB typical	-
	+N	All formats	25 < 130	800*	1300 typical	13	54	370 HB typical	20 °C 62 J (long)
	+QT	All formats	25 < 130	1130*	1570 typical	11	50	430 HB typical	20 °C 55 J (long)

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

Transformation temperatures

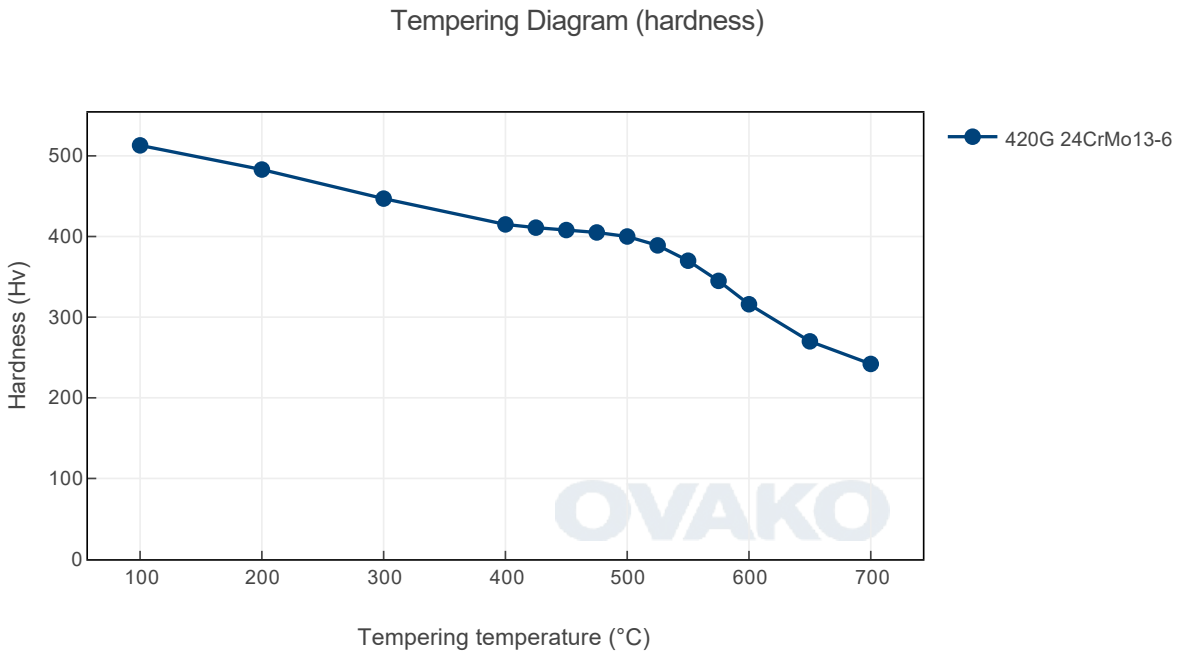
	Temperature °C
AC1	776
AC3	859

Heat treatment recommendations

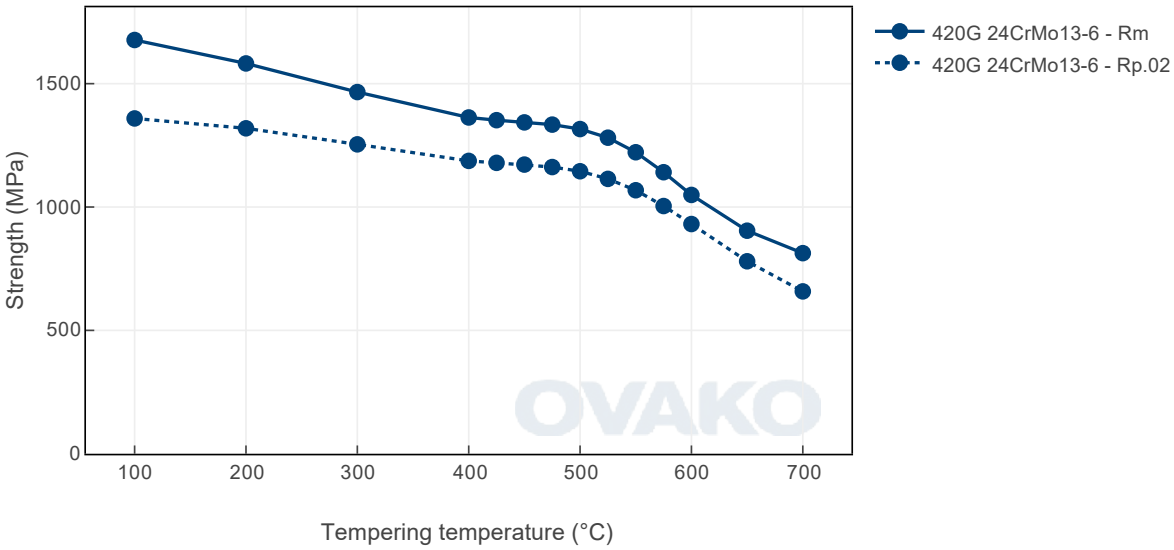
Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+AR	840-1040°C	In air
Normalizing	+N	930-960°C	In air
Quench & Tempering	+QT	840-880°C	In oil or in air
Tempering	+T	160-250°C	In air

Heat Treatment Guide generated Graphs

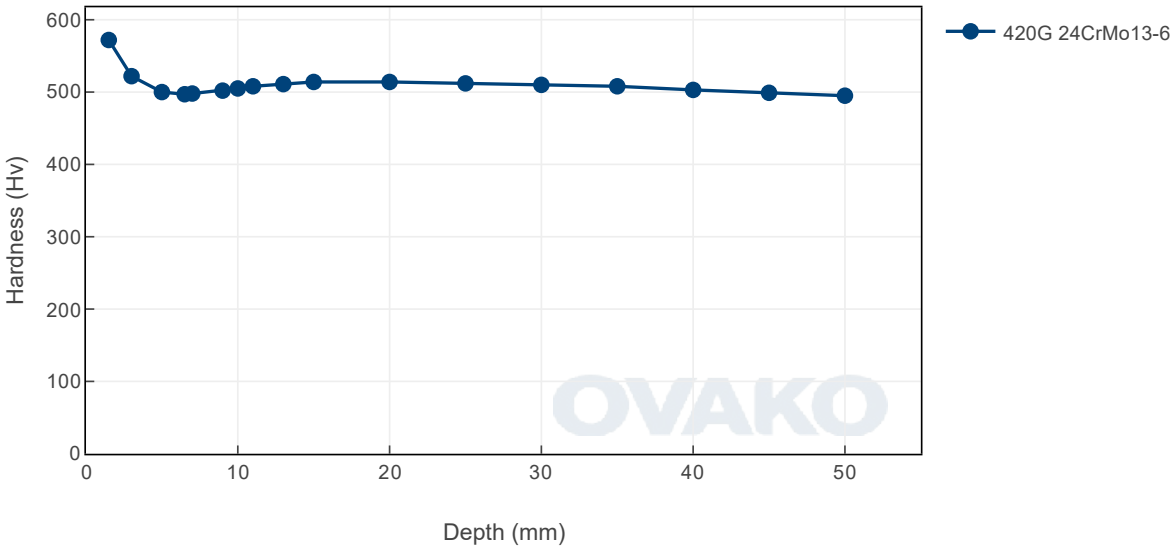
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



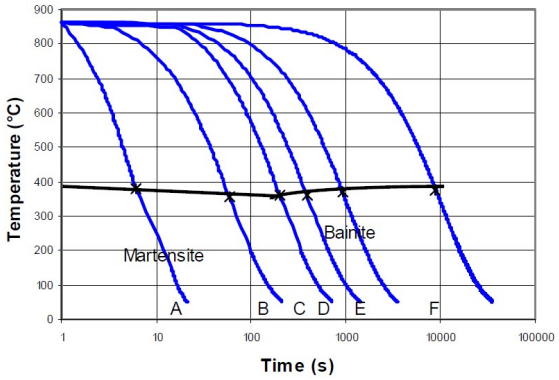
Tempering Diagram (strength)



Jominy

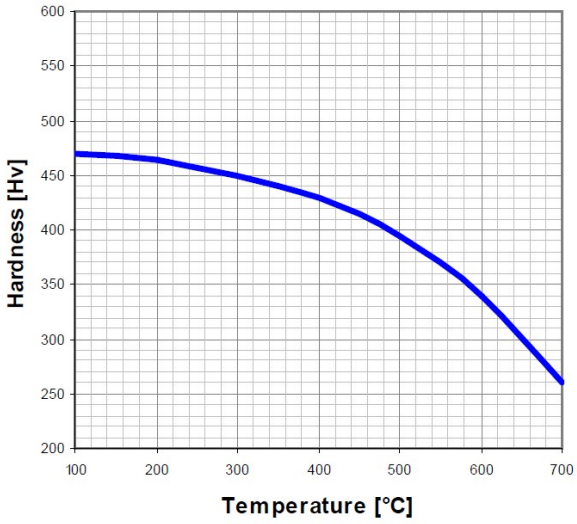

Hardness (Hv)
600
500
400
300
200
100
0
0
10
20
30
40
50
Depth (mm)
420G 24CrMo13-6
OVAKO

CCT - steel grade Ovako 420G



	A	B	C	D	E	F
t_{8-5} [s]	3	30	100	200	500	5000
Hv_{30}	494	470	467	465	452	354

Tempering response - Ovako 420G



Austenitized at 870°C and oil quenched. Tempered for 1h.

Steel cleanliness

Micro inclusions - steelgrade 420G									Macro inclusions - 420G	
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	< 5 mm/dm^2
	Th	He	Th	He	Th	He	Th	He		
	2.5	1.5	1.0	0.5	0	0	0.5	0.5		

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)
420G	Round bar	+AR	690	291
420G	Round bar	+A	694	293
420G	Tube,wall	+AR	719	321
420G	Tube,wall	+A	722	324

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:

Via e-mail: info@ovako.com

Via telephone: +46 8 622 1300

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

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