

22NiCrMo12-5* All

General Information

22NiCrMo12-5* is a group of carburizing steel with high hardenability. High strength combined with excellent toughness and high fatigue strength makes them well suited for applications in the mining industry. Tight alloying windows provides the grades with excellent hardenability and strength control. Can be delivered as rolled, annealed or austenitized and air hardened.

253A - Standard variant with high hardenability and controlled sulphur content for improved machinability.

253R - Variant with reduced sulphur content to meet the clean steel BQ (Bearing Quality) requirement for improved fatigue properties.

253L - Variant with increased carbon range for increased core hardness after carburizing. Controlled sulphur content for improved machinability.

253S - Variant with slightly increased carbon range for increased core hardness after carburizing. Controlled sulphur content for improved machinability.

4722 - Continuous cast variant with slightly increased carbon range for increased hardness after carburizing.

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.

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

9317, 14NiCrMo13-4, 23NiCrMo12-5, 25NiCrMo12-5, 19NiCrMo11-5, EN27

Chemical composition

Variant	Cast	Di	Weldability		C%	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
253A	IC		CEV 0.74 _{max}	Min	0.21	0.20	0.65	-	0.015	1.25	2.85	0.22
			Pcm 0.43 _{max}	Max	0.23	0.35	0.75	0.020	0.025	1.35	3.00	0.26
253R	IC		CEV 0.93 _{max}	Min	0.22	0.20	0.70	-	0.005	1.27	2.85	0.22
			Pcm 0.45 _{max}	Max	0.24	0.35	0.75	0.025	0.008	1.35	3.05	0.26
253L	IC		CEV 0.95 _{max}	Min	0.22	0.20	0.55	-	0.015	1.20	2.85	0.20
			Pcm 0.47 _{max}	Max	0.26	0.35	0.75	0.025	0.025	1.40	3.15	0.27
253S	IC		CEV 0.75 _{max}	Min	0.22	0.20	0.70	-	0.015	1.27	2.85	0.22
			Pcm 0.45 _{max}	Max	0.24	0.35	0.75	0.020	0.025	1.35	3.00	0.26
4722	CC	7.1	CEV 0.87 _{max}	Min	0.22	0.20	0.55	-	0.015	1.20	2.85	0.20
			Pcm 0.42 _{max}	Max	0.26	0.35	0.75	0.025	0.025	1.40	3.15	0.27

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A ₅ [%]	Reduction of area Z _{min} [%]	Hardness
253A	+A	Round bar	25 < 80	500*	640-720	22	70	200-220 HB
	+N	Round bar	25 < 80	800*	1200-1490	14	55	350 HB typical
	+Q	Round bar	25 < 80	930*	1320-1420	11	57	440-460 HB
4722	+AR	Round bar	25 < 150	-	-	-	-	< 400 HB
	+A	Round bar	25 < 150	-	-	-	-	< 269 HB

*R_{p0.2} * R_{eh}, ** R_{el}*

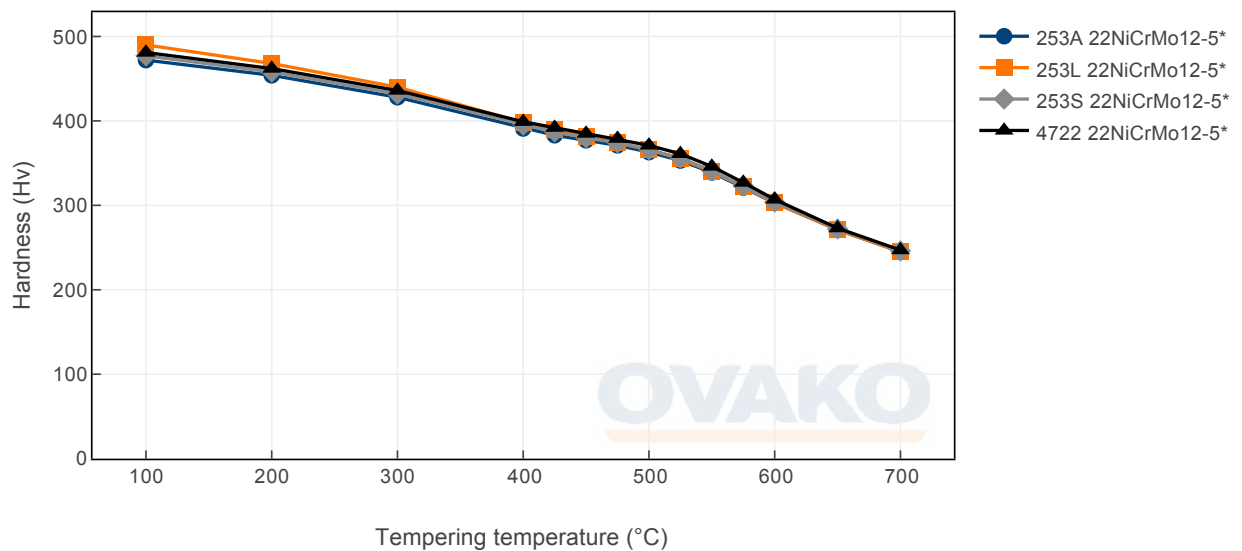
Transformation temperatures

	Temperature °C
MS	356
AC1	696
AC3	787

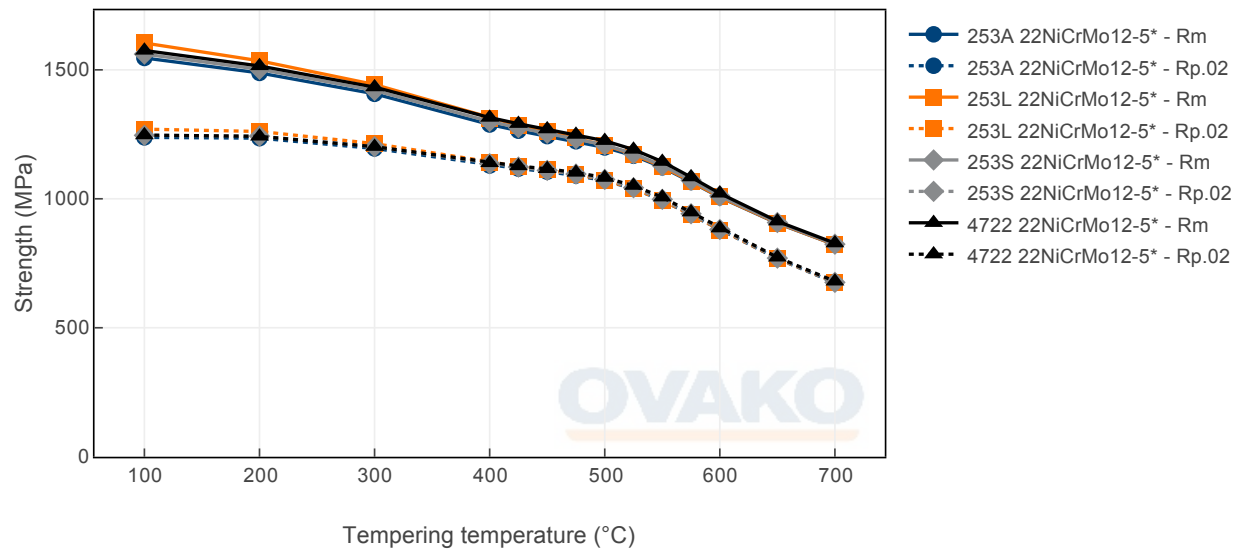
Heat Treatment Guide generated Graphs

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.

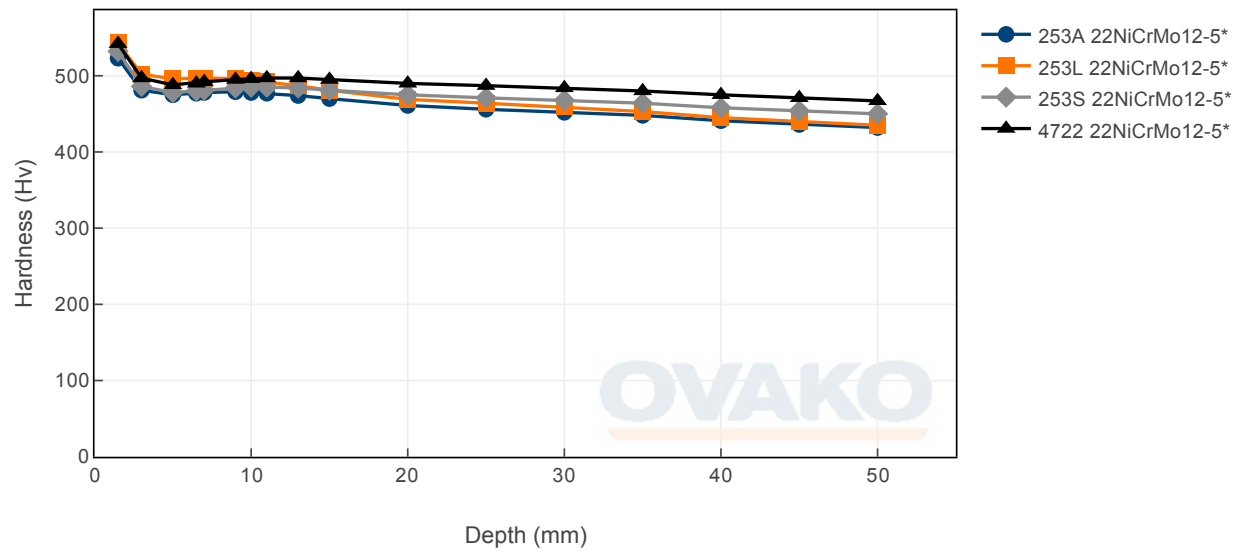
Tempering Diagram (hardness)



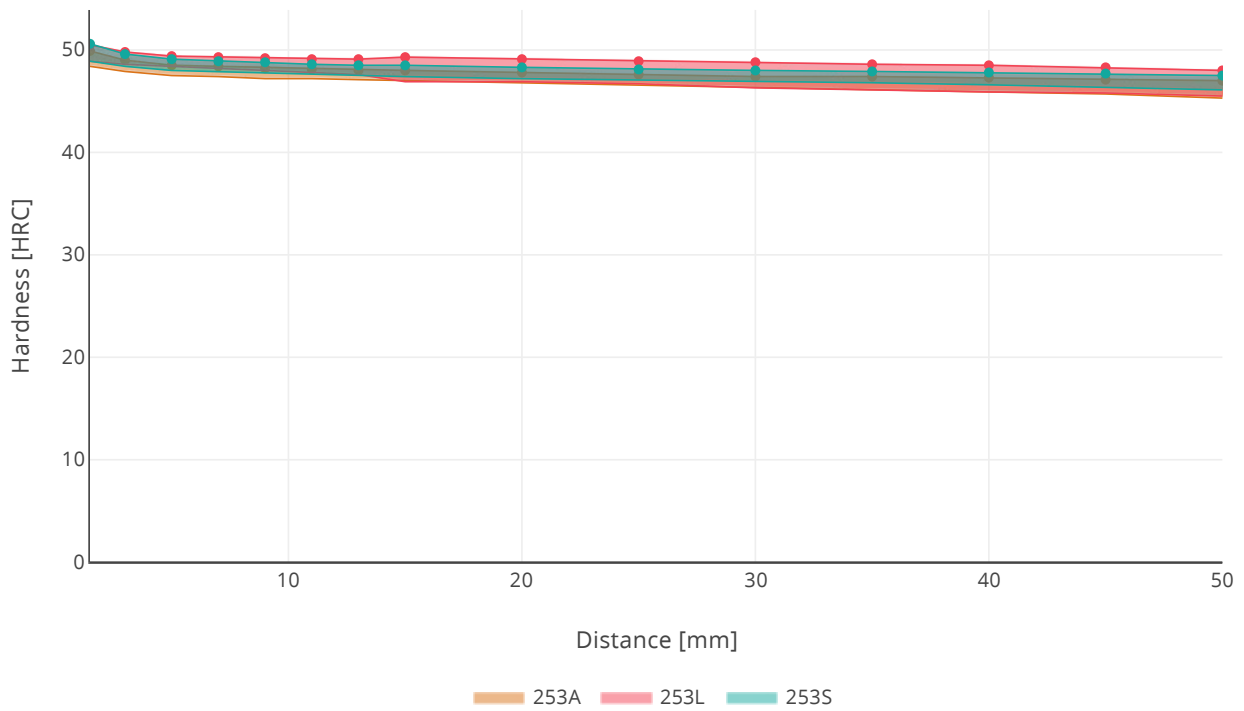
Tempering Diagram (strength)



Jominy



Hardenability

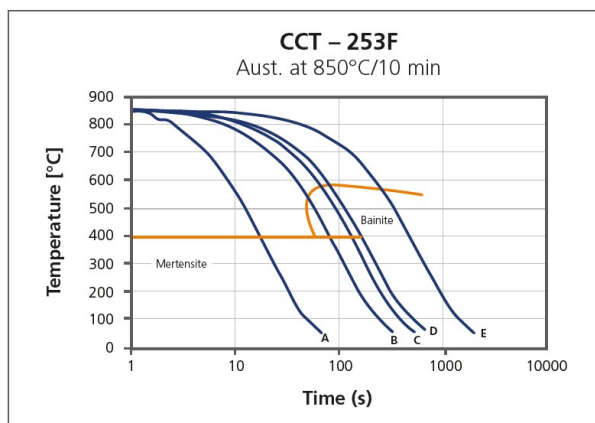


Jominy hardenability of Ovako 253. Average value with +/- standard deviation.

Steel cleanliness

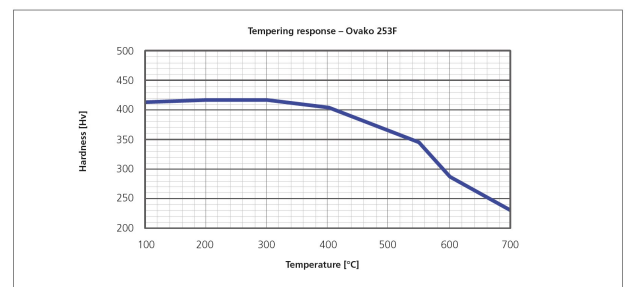
Applied standard		ASTM E45								Macro inclusions					
Applied standard										ISO 3763 (Blue fracture)					
Sampling		ASTM A295								Sampling		Statistical testing on billets			
Maximum average limits		A		B Micro inclusions				C		D		Limits		< 5 mm/dm ²	
		Th	He	Th	He	Th	He	Th	He	Th	He				
		2,5	1,5	1,0	0,5	0	0	0,5	0,5						

CCT



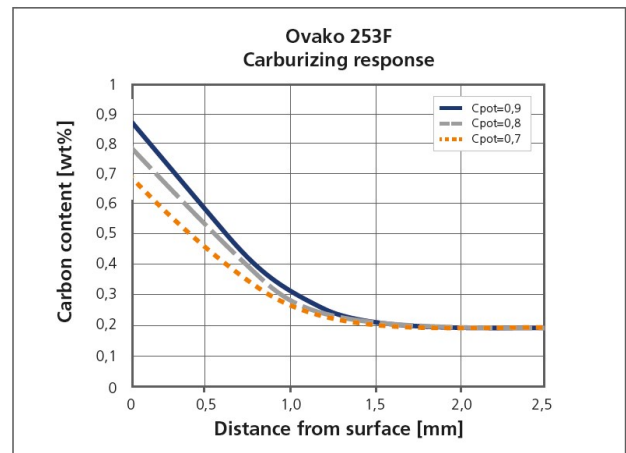
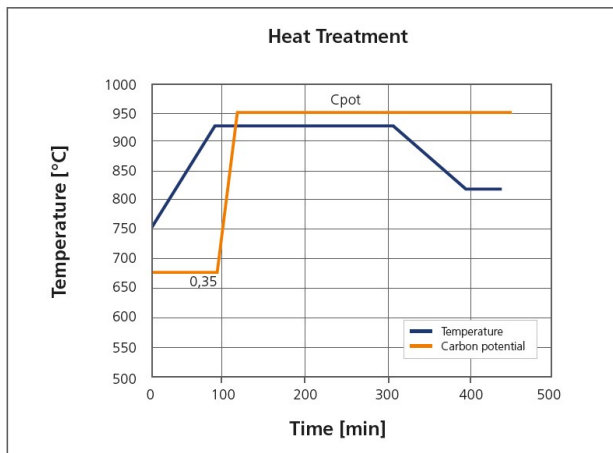
	A	B	C	D	E
t ₈₋₅ [s]	10	50	80	100	300
HV ₃₀	420	420	345	334	293

Tempering response - 253



Tempering response for Ovako 253F: Austenitised at 870°C for 30 min and oil quenched. Tempered one hour at each test temperature.

Case carburizing response - 253



Carburization response for Ovako 253F for the cycles shown.

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](#).

In many international comparisons the crude steel Scope 1-2 emission is a key parameter, ie. the CO₂ emission from the steel works itself.

As of 1 January 2022 we carbon offset all our scope 1 and 2 volume shown below.

Steel works	Hofors	Smedjebacken	Imatra
CO ₂ e/kg	120	62	76

To get the full picture of our products environmental impact we have to look at all of our CO₂ 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 (CO ₂ e kg /1000 kg steel)	Climate compensated Net emission = Scope 3 (CO ₂ e kg /1000 kg steel) Scope 1 - 2 = 0 (compensated)
253	Round bar	+AR	1117	721
253	Round bar	+A	1124	724
253	Tube,wall	+A	1182	770
253	Tube,wall	+AR	1169	766
4722	Round bar	+A	963	661

As of 1 January 2022 we use carbon offset for all our scope 1- 2 emissions, so in practice the climate compensated data is the same as the full Scope 3 level.

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/m ³)
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

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

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