

## STEEL GRADE

Last revised: Thu, 16 Jan 2025 14:29:00 GMT

18NiCrMo14-6 All

## General Information

18NiCrMo14-6 is a case hardening steel with high toughness used for bearing and transmission components. There are two different versions of the grade with high cleanliness requirements. The high hardenability ensures a through hardenability of large sections.

255G - Bearing quality (BQ) variant with low sulphur content and high cleanliness demands

255Q - Isotropic quality (IQ) with isotropic properties and improved fatigue strength due to higher cleanliness levels, and a finer size and distribution of non-metallic inclusions

## 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

1.3533

## Chemical composition

Variant	Cast	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
255G	IC	CEV 0.96 <sub>max</sub>	Min	0.15	0.15	0.40	-	-	1.30	3.25	0.15
		Pcm 0.41 <sub>max</sub>	Max	0.18	0.40	0.70	0.025	0.005	1.60	3.75	0.25
255Q	IC	CEV 0.96 <sub>max</sub>	Min	0.15	0.15	0.40	-	-	1.30	3.25	0.15
		Pcm 0.41 <sub>max</sub>	Max	0.18	0.40	0.70	0.025	0.002	1.60	3.75	0.25
EN ISO 683-17	Std	CEV <sub>max</sub>	Min	0.15	-	0.40	-	-	1.30	3.25	0.15
		Pcm <sub>max</sub>	Max	0.20	0.40	0.70	0.025	0.015	1.60	3.75	0.25

## Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Hardness
255G	+SA	All formats	24 < 190	220 HB typical
255Q	+SA	All formats	24 < 120	220 HB typical

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

## Transformation temperatures

	Temperature °C
AC1	695
AC3	805

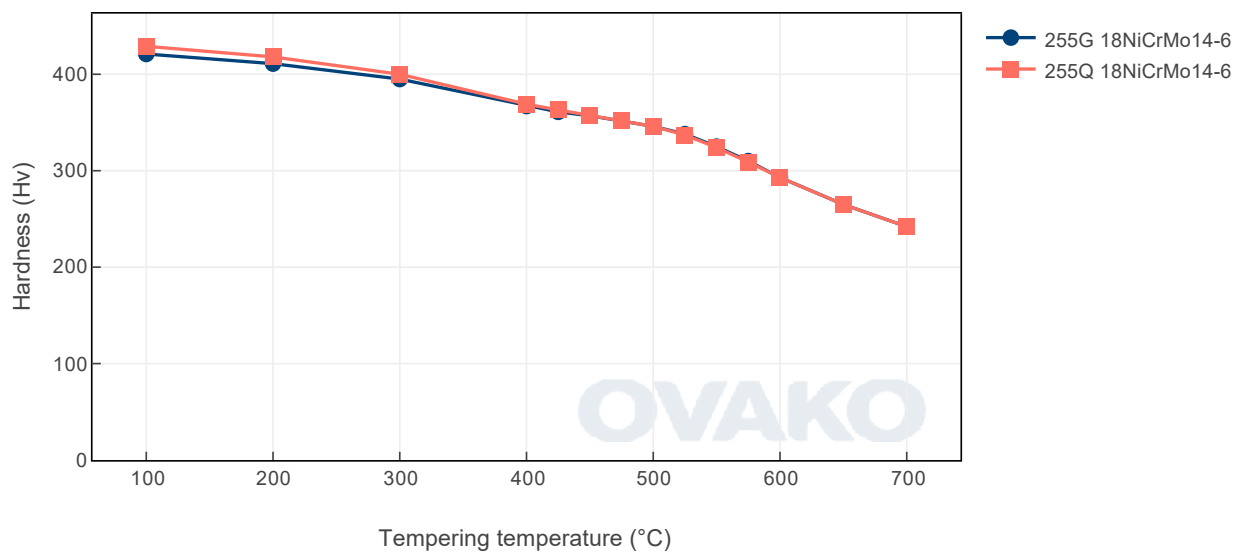
## Heat treatment recommendations

Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+AR	800-1200°C	In air
Normalizing	+N	860-890°C	In air
Soft annealing	+SA	600-670°C / 2h	In air
Carburizing	+C	850-930°C Carbon potential see diagram	
Hardening	+Q	840-890°C when Q/T is applied	In oil
Hardening	+Q	780-830°C when hardening os as-carburized component	In oil
Tempering	+T	160-250°C	In air

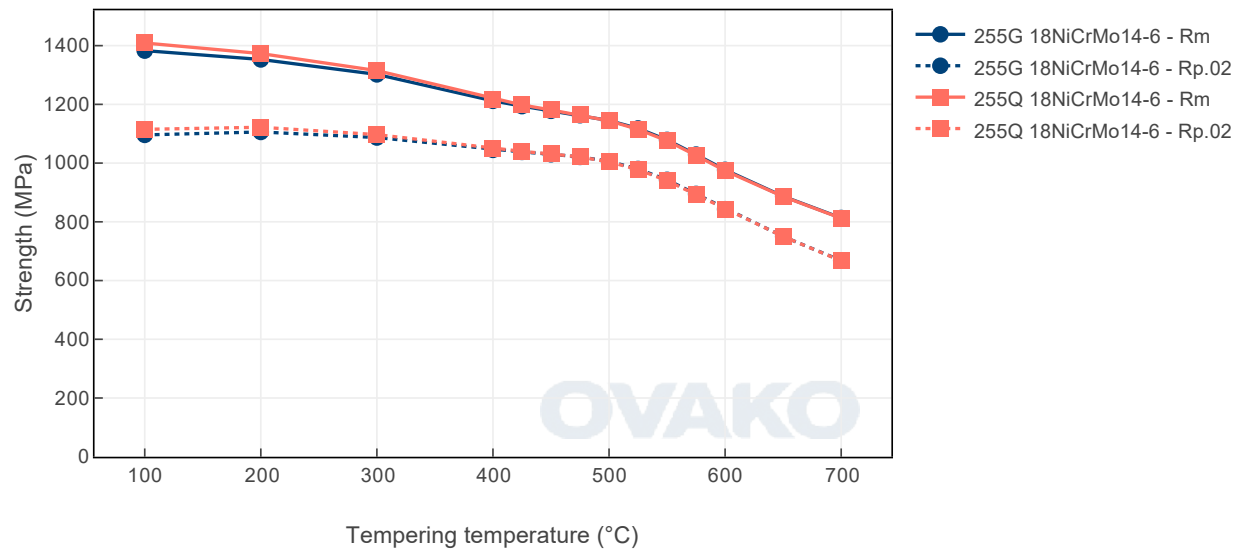
## Heat Treatment Guide generated Graphs

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.

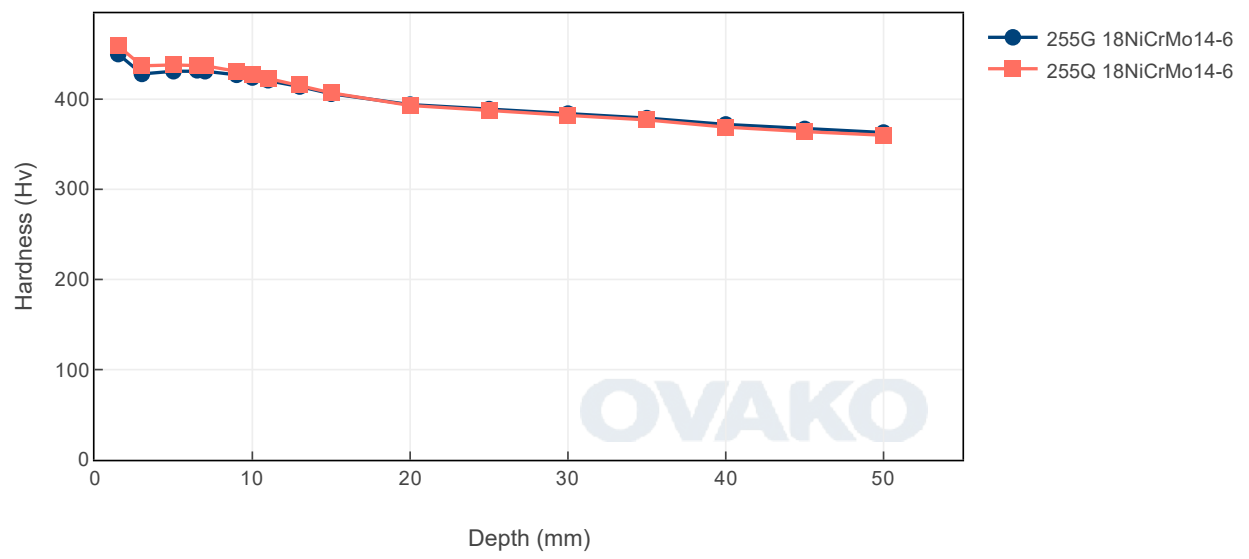
Tempering Diagram (hardness)



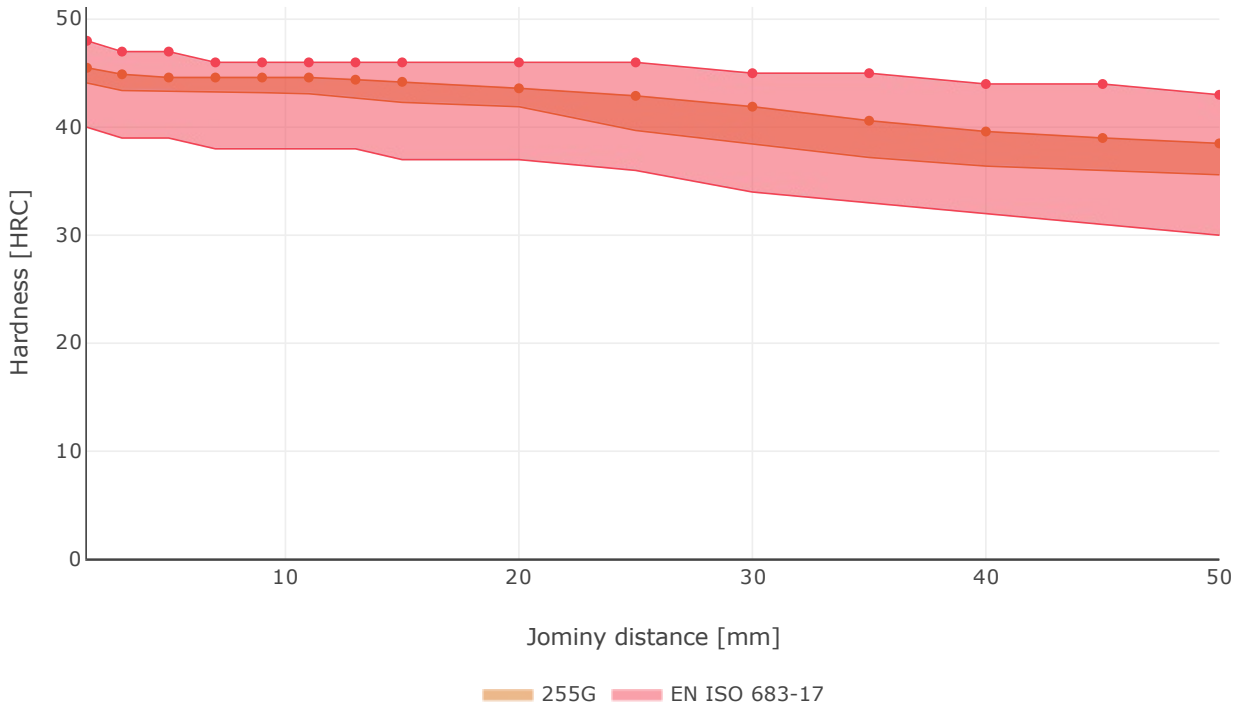
Tempering Diagram (strength)



# Jominy



## Hardenability



Jominy hardenability according to ASTM A255. 255G data is average value with +/- standard deviation. En ISO 683-17 according to +H variant

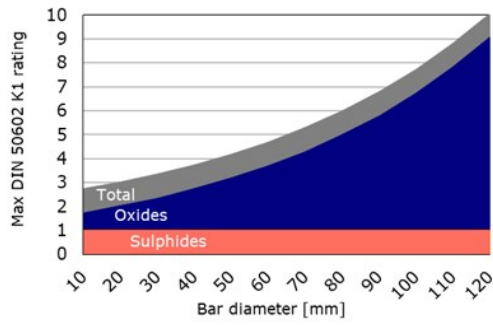
## Steel cleanliness

Micro inclusions - Steel grade 255G									Macro inclusions - 255G	
Applied standard	ASTM 45								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 <sup>2</sup>
	Th	He	Th	He	Th	He	Th	He		
	2.0	1.5	0.8	0.1	0	0	0.5	0.4		

Micro inclusions - Steel grade 255Q									Macro inclusions - 255Q	
Applied standard	DIN 50602 K1								Applied standard	10 M Hz UST (Ovako internal standard)
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	< 10 defects/dm <sup>3</sup> > 0,2 mm FBH

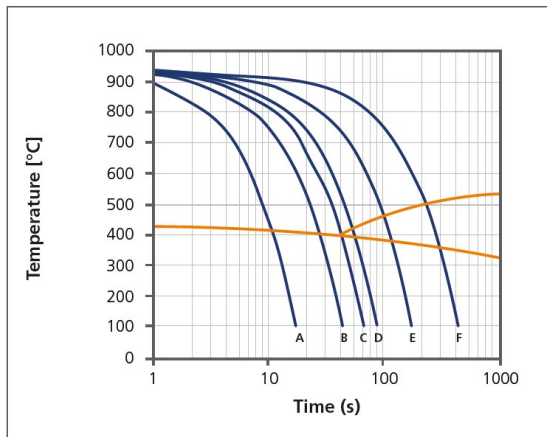
## IQ

### Inclusion limits IQ-processed steel



## CCT

### CCT – Ovako 255G

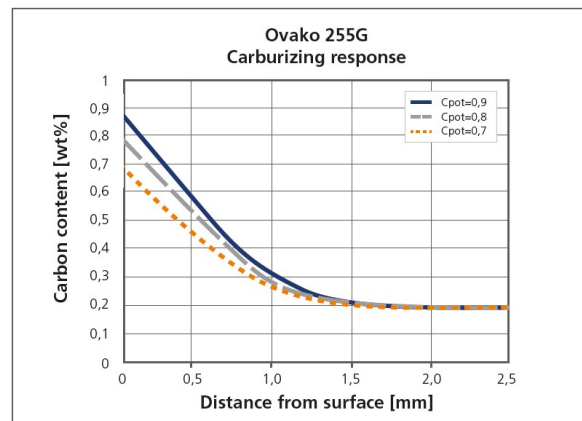
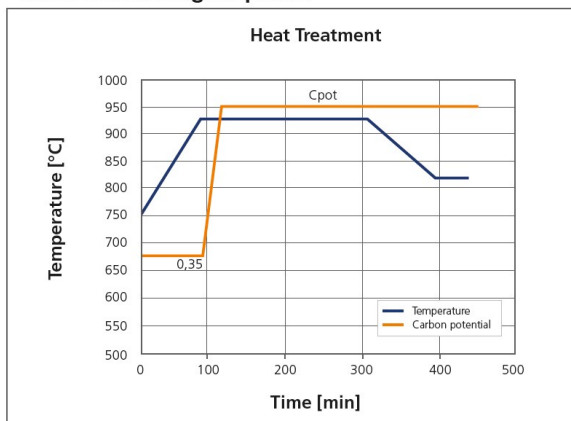


## CCT

	A	B	C	D	E	F
$t_{8-5}$ [s]	6	15	23	30	60	150
HV <sub>30</sub>	420	420	410	400	395	370

## Carburizing

### Case carburizing response



Carburization response for Ovako 255G for the cycles shown the figure above.

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)
255	Round bar	+AR	1179
255	Round bar	+FP	1186
255	Tube,wall	+AR	1250
255	Tube,wall	+FP	1252

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.

### 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.*