

## 20NiMo9-7\* All

### General Information

Ovako 158Q is an ingot cast case hardening steel specially designed to minimize the occurrence of internal oxidation. Furthermore it is produced with the highest cleanliness level, isotropic quality (IQ), to ensure a minimum of oxidic and sulphidic inclusions.

Ovako 258Q is an ingot cast case hardening variant, with slightly increased hardenability. This variant is also produced with the highest cleanliness level, isotropic quality (IQ).

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

### IQ-Steel®

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

### Similar designations

22NiMo9-9\*

### Chemical composition

Variant	Cast	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %
158Q	IC	CEV 0.68 <sub>max</sub>	Min	0.18	-	0.22	-	-	0.35	2.25	0.67	-
		Pcm 0.36 <sub>max</sub>	Max	0.21	0.10	0.30	0.025	0.002	0.40	2.35	0.70	0.100
258Q	IC	CEV 0.74 <sub>max</sub>	Min	0.21	-	0.22	-	-	0.35	2.25	0.87	-
		Pcm 0.4 <sub>max</sub>	Max	0.24	0.10	0.30	0.025	0.002	0.40	2.35	0.90	0.100

## Transformation temperatures

	Temperature °C
MS	406
AC1	690
AC3	815

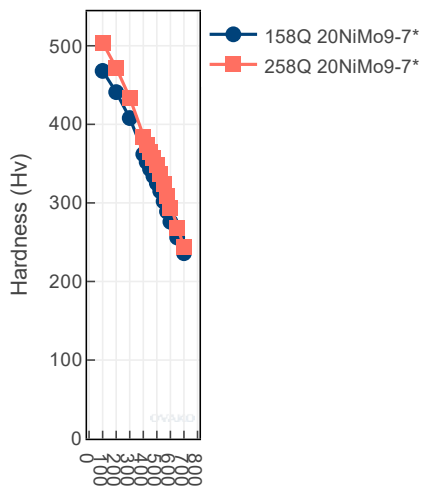
## Heat treatment recommendations

Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1200°C	In air
Normalizing	+N	860-890°C	In air
Soft annealing	+A	600-670°C /2h	In air
Carburizing	+C	850-930°C Carbon potential see diagram	
Hardening	+QT	840-890°C	In oil
Hardening	+QT	780-830°C Hardening of as-carburized components	In oil

## Heat Treatment Guide generated Graphs

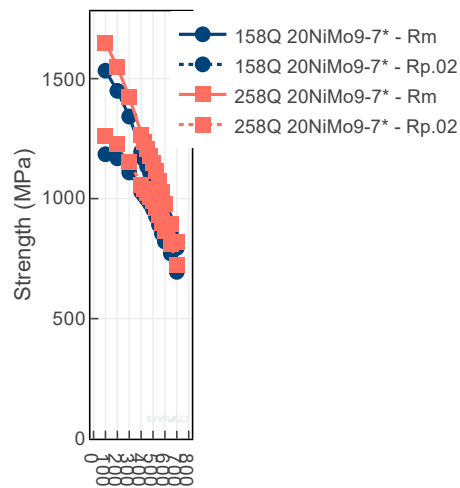
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.

Tempering Diagram (hardness)



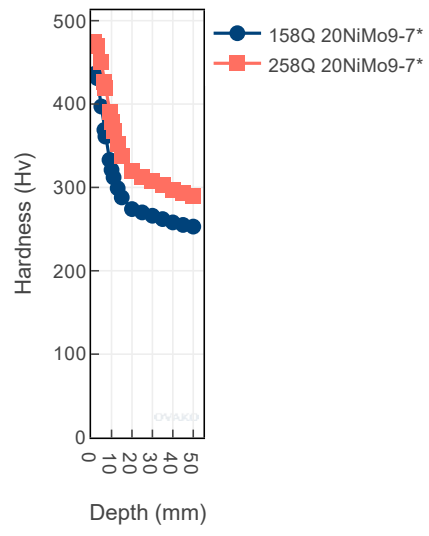
Tempering temperature (°C)

Tempering Diagram (strength)



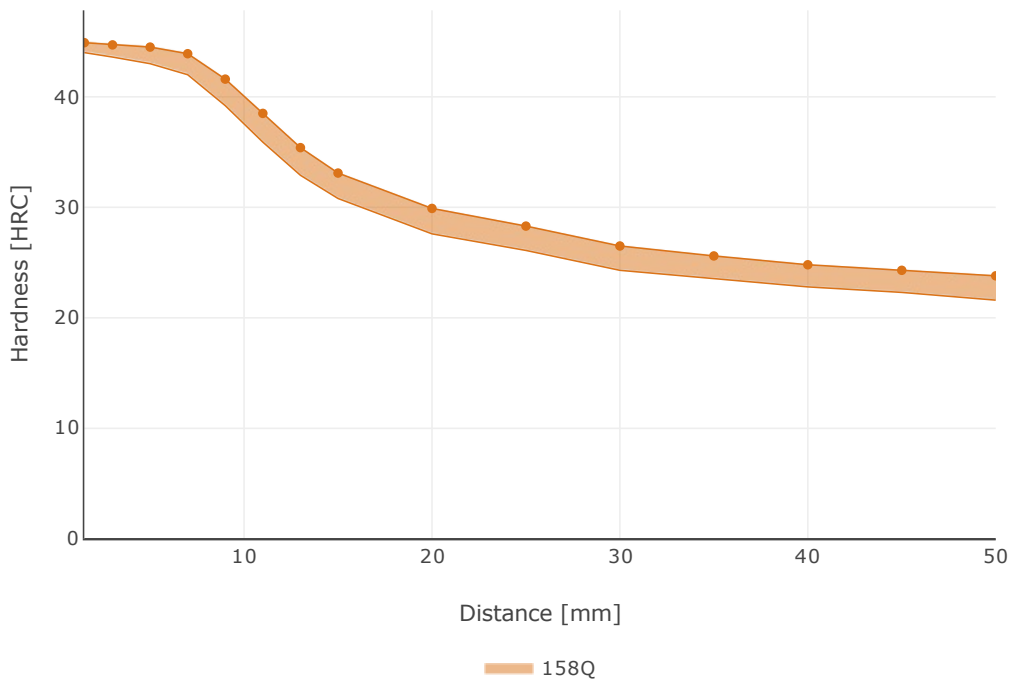
Tempering temperature (°C)

# Jominy





## Hardenability



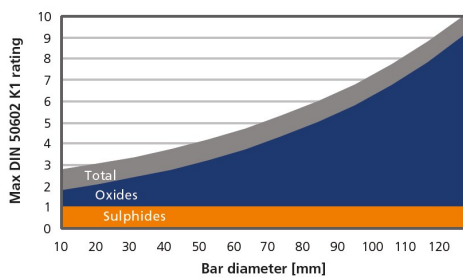
Typical Jominy hardness for steelgrade Ovako 158Q.

## Steel cleanliness - IQ

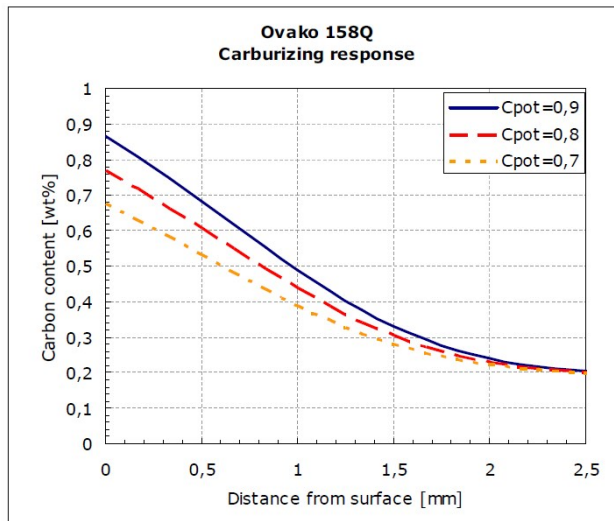
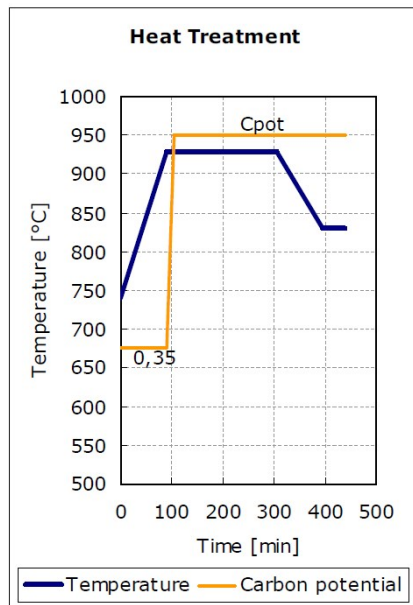
Micro inclusions - IQ		Macro inclusions - IQ	
Applied standard	DIN 50602 K1	Applied standard	10 MHz UST (Ovako internal standard)
Sampling	Six random samples from final product dimension	Sampling	Statistical testing on billets
Limits	The limit is dimension dependent. The average rating of six samples 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



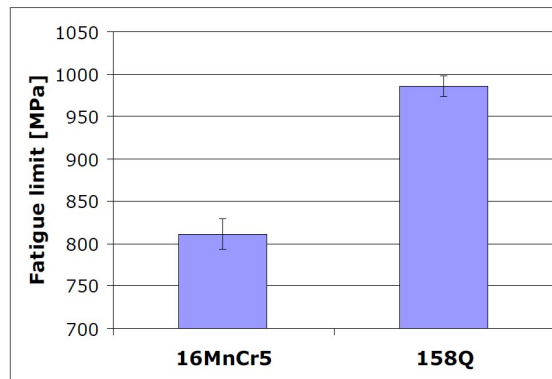
## Carburizing response - Ovako 158Q



Carburization response for Ovako 158Q for the cycles shown in the left figure.

## Fatigue properties

Test method:	Rotating beam
Test procedure:	Stair-case method
Specimen:	1mm notch Ø10 mm
Heat treatment:	Carburized CD 0.6mm
Hardness:	Surface hardness 670 HV



Fatigue limit defined at 10 million cycles for carburized notched specimen. Error bar shows 95% confidence limits

## 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 CO<sub>2</sub> 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 <sub>2</sub> e/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 (CO <sub>2</sub> e kg /1000 kg steel)	Climate compensated Net emission = Scope 3 (CO <sub>2</sub> e kg /1000 kg steel) Scope 1 - 2 = 0 (compensated)
158Q	Round bar	+AR	1006	613
158Q	Round bar	+SA	1013	616
158Q	Tube,wall	+AR	1068	667
158Q	Tube,wall	+SA	1069	667
258Q	Round bar	+AR	1040	643
258Q	Round bar	+SA	1045	647
258Q	Tube,wall	+AR	1087	684
258Q	Tube,wall	+SA	1089	684

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### Other properties (typical values)

Youngs module (GPa)	Poisson's ratio (-)	Shear module (GPa)	Density (kg/m <sup>3</sup> )
210	0.3	80	7800
Average CTE 20-300°C (µm/m <sup>2</sup> K)	Specific heat capacity 50/100°C (J/kg <sup>2</sup> K)	Thermal conductivity Ambient temperature (W/m <sup>2</sup> 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:

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

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