

## 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).

### IQ-Steel®

(Isotropic Quality) is an isotropic quality ultra clean steel. IQ-Steel is optimized for fatigue strength by a strict control of steel cleanliness. IQ-Steel, a further development of BQ-Steel, is an isotropic and ultra clean steel with properties that match re-melted steels. Based on thousands of examinations by Ovako into the effects of defects on fatigue performance, the metallurgy of IQ-Steel is purer and far more consistent than conventional grades, and designed specifically to perform well in multi axial loading. This enables the manufacturing of lighter, slimmed down components like gears, bearings and other critical parts. The steels are helping our customers to achieve new design solutions and implement higher standards of finished product performance. Key to these practical advantages are Ovako's own unique, clean and consistent modern steelmaking processes that remove harmful inclusions and impurities from within the steel. IQ-Steels contain smaller and more fragmented inclusions and can handle much higher mechanical forces in all directions than conventional steels. IQ-Steels are newer, but already now well established in high pressure automotive applications. Modern diesel engines, with high and cyclic injection pressures, have proven to be an ideal application. Transmission components are another emerging area of strong interest.

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

### Similar designations

22NiMo9-9\*

### Chemical composition

Variant	Cast	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %
158Q	IC	CEV0.68 <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	CEV0.74 <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

## Mechanical Properties

### Variant

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

## 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

## Hardenability

Typical Jominy hardness for steelgrade Ovako 158Q and 258Q.

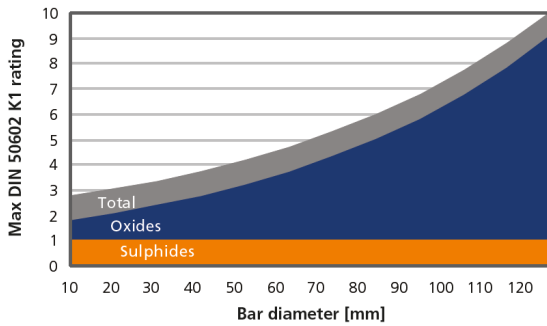
## Steel cleanliness - IQ

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

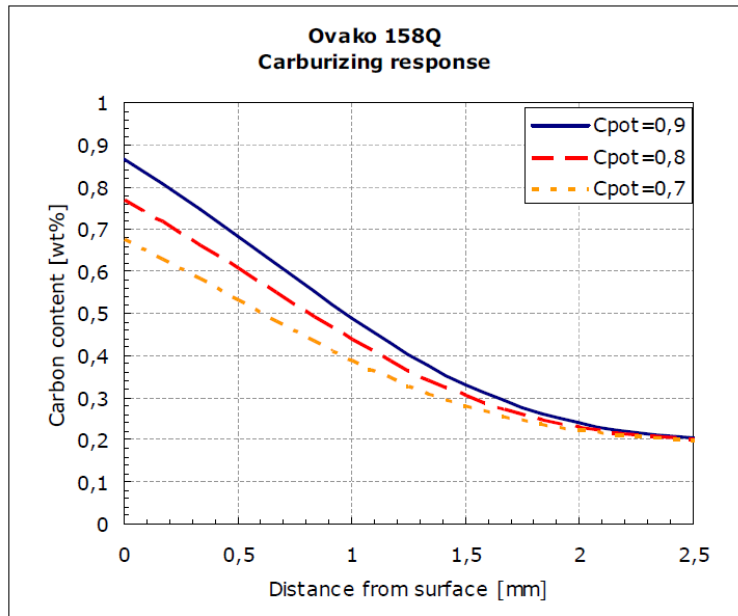
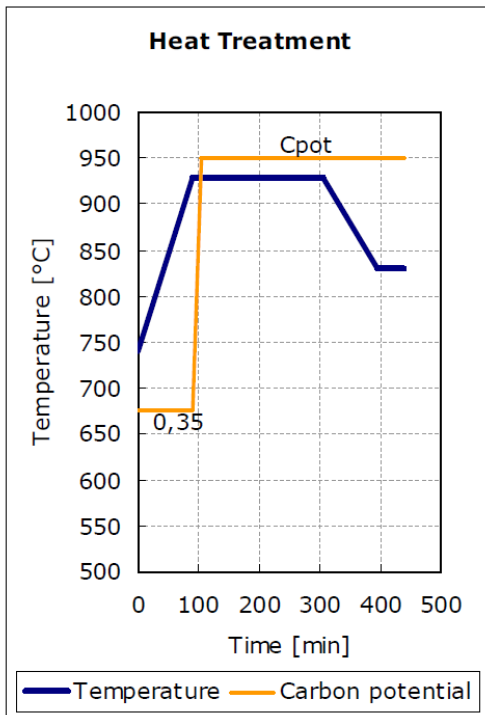
Other properties (typical values)

## IQ

### Inclusion limits IQ-processed steel



## Carburizing response - Ovako 158Q

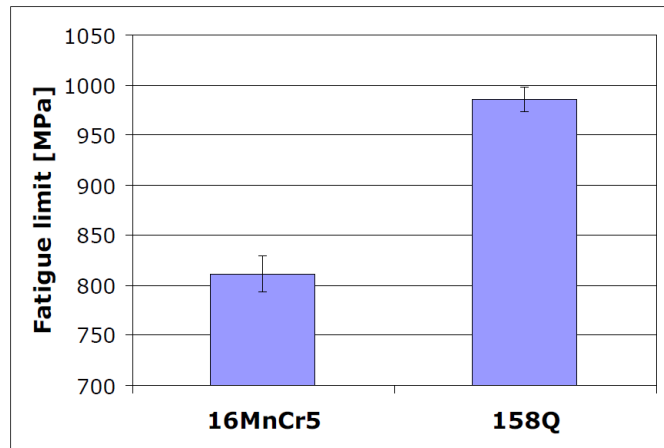


Carburization response for Ovako 158Q for the cycles shown in the left figure.

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

## 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

## 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/>

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