MATERIAL DATA SHEET

STEEL GRADE

Last revised: Wed, 16 Jul 2025 08:24:49 GMT

OVAKO

18CrNiMo7-6 All

General Information

18CrNiMo7-6 is a case hardening steel with high toughness. There are a number of variants with high cleanliness requirements. All variants possess tighter composition ranges compared to the standard. One variant is produced with the quality class IQ (isotropic quality). This ensures a very low number of elongated sulphide inclusions which will give more isotropic properties. The high oxidic cleanliness will enable the steel to meet the same high cleanliness demands as for re-melted qualities.

Grade 159A - Variant with low sulphur content and high cleanliness demands

Grade 159B - Variant with controlled sulphur content for consistent machinability and +H hardenability

Grade 159Q - Isotropic properties (IQ) and better fatigue strength due to higher cleanliness levels, and a finer size and distribution of non-metallic inclusions

Grade 159X - Variant with controlled sulphur content for consistent machinability and +H hardenability

Grade 159S - Variant with increased sulphur content.

Grade 4761(MoCN216) - Low sulphur variant of Imatra

Similar designations

1.6587, AISI4820, DIN17CrNiMo6, 18CND6, EN ISO 683-17

Chemical composition

Variant	Cast	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	Cu %
159A	IC	CEV 0.91_{max}	Min	0.15	0.10	0.50	-	-	1.60	1.50	0.25	-
		Pcm 0.4_{max}	Max	0.19	0.30	0.95	0.015	0.005	1.80	1.70	0.35	-

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A_5 [%]
159A	+QT	Round bar	30 typical	780	1080-1320	8
		Round bar	63 typical	690	980-1270	8

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

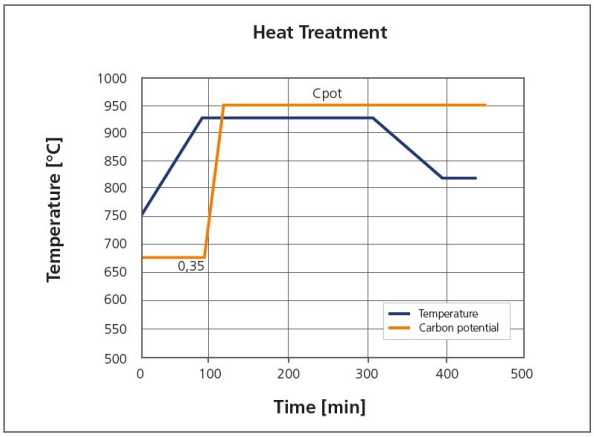
Transformation temperatures

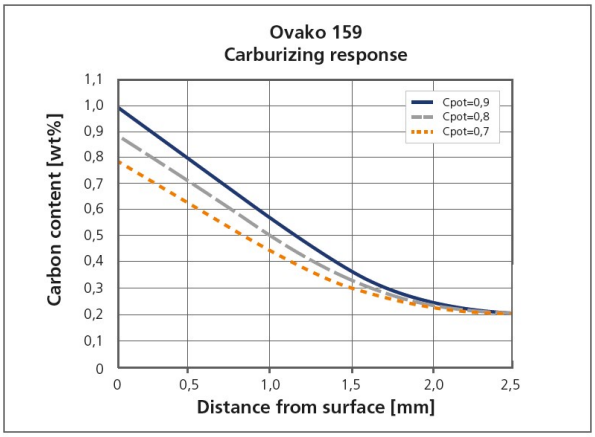
	Temperature °C
MS	410
AC1	726
AC3	833

Heat treatment recommendations

Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1200°C	In air
Normalizing	+N	860-890°C	In air
Carburizing	+C	850-930°C Carbon potential see diagram	
Hardening	+QT	840-870°C	In oil
Hardening	+QT	780-830°C Hardening of as-carburized components	In oil

Carburizing response - Ovako 159





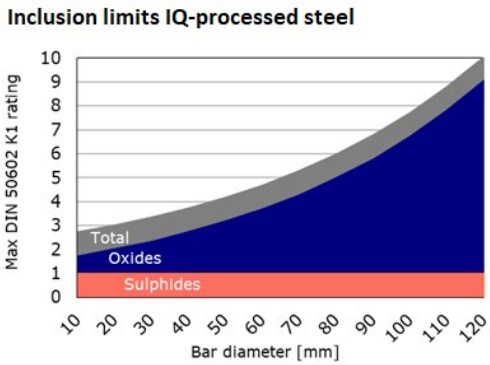
Carburization response for Ovako 159 for the cycles shown in the left figure.

Steel cleanliness

Micro inclusions - steel grade 159X										Macro inclusions - 159X	
Applied standard	ASTM E45									Applied standard	ISO 3763 (Blue fracture)
Sampling	ASTM A295									Sampling	Statistical sampling on billets
Maximum average limits	A		B		C		D			Limits	<2,5 mm/dm^2
	Th	He	Th	He	Th	He	Th	He			
	2.0	1.5	1.5	0.5	0.0	0.0	1.0	1.0			

Micro inclusions - IQ - steel grade 159Q			Macro inclusions - IQ - 159Q	
Applied standard	DIN 50602 K1		Applied standard	10 MHz UST (Ovako internal procedure)
Sampling	Six random sample from final product		Sampling	Statistical sampling on billets
Limits	The limits is dimension dependent. The average rating of six samples should not exeed the limits given in the graph.		Limits	<10 defects/dm3 >0,2 mm FBH

IQ



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)
159	Round bar	+AR	874	475
159	Round bar	+FP	880	482
159	Tube,wall	+AR	919	522
159	Tube,wall	+FP	922	524
4761, MoCN 216	Round bar	+AR	792	489

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.

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/

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.