MATERIAL DATA SHEET

STEEL GRADE

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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 %
4761, MoCN 216	CC	CEV 0.79_{max}	Min	0.15	0.10	0.50	0.000	-	1.50	1.40	0.25	0.00
		Pcm 0.36_{max}	Max	0.21	0.40	0.90	0.015	0.015	1.80	1.70	0.35	0.30

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Hardness
4761, MoCN 216	+AR	Round bar	25 < 160	< 320 HB
	+A	Round bar	25 < 160	< 229 HB

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

Transformation temperatures

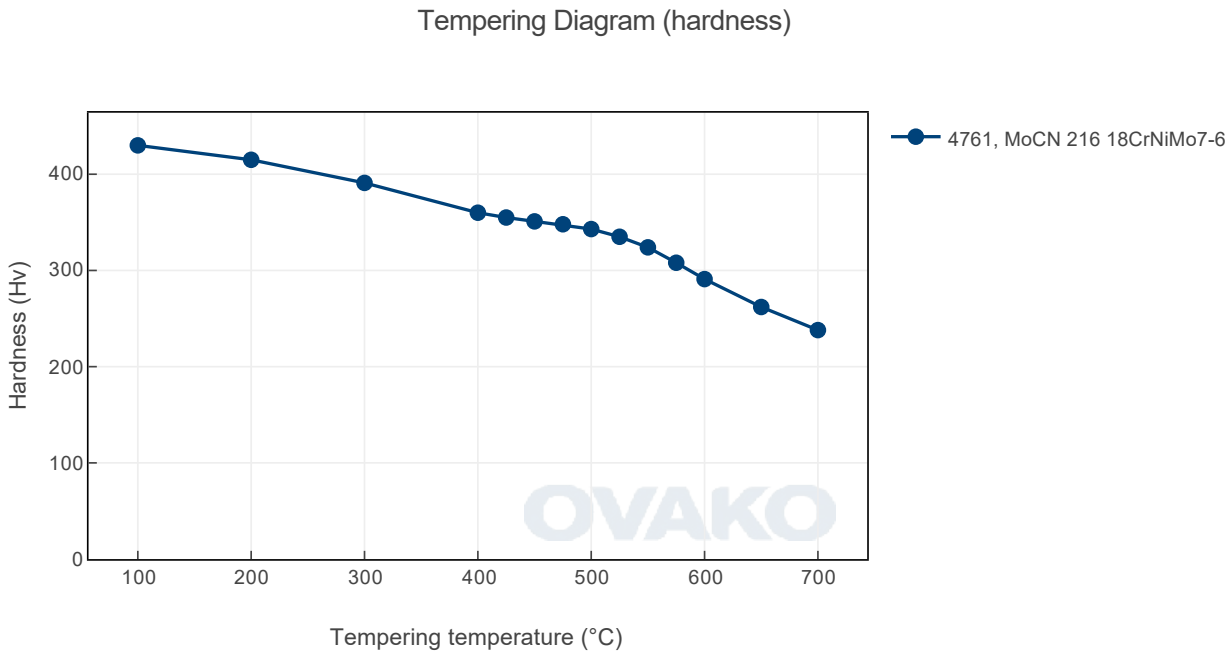
	Temperature °C
MS	410
AC1	726
AC3	833

Heat treatment recommendations

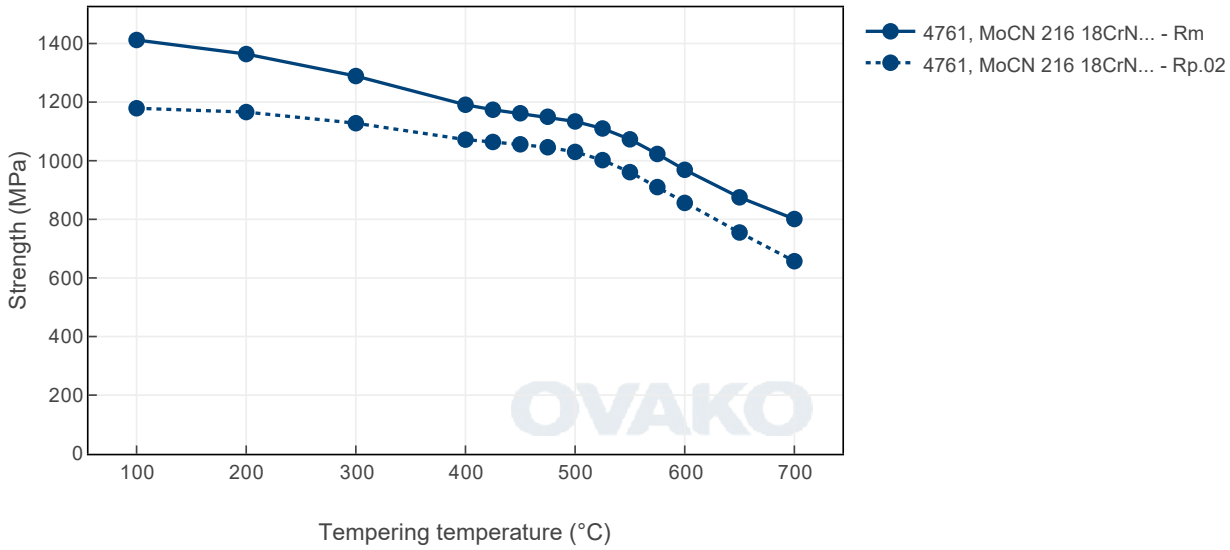
Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1200°C	In air
Normalizing	+N	860-890°C	In air
Carburizing	+C	850-930°C Carbon potential see diagram	
Hardening	+QT	840-870°C	In oil
Hardening	+QT	780-830°C Hardening of as-carburized components	In oil

Heat Treatment Guide generated Graphs

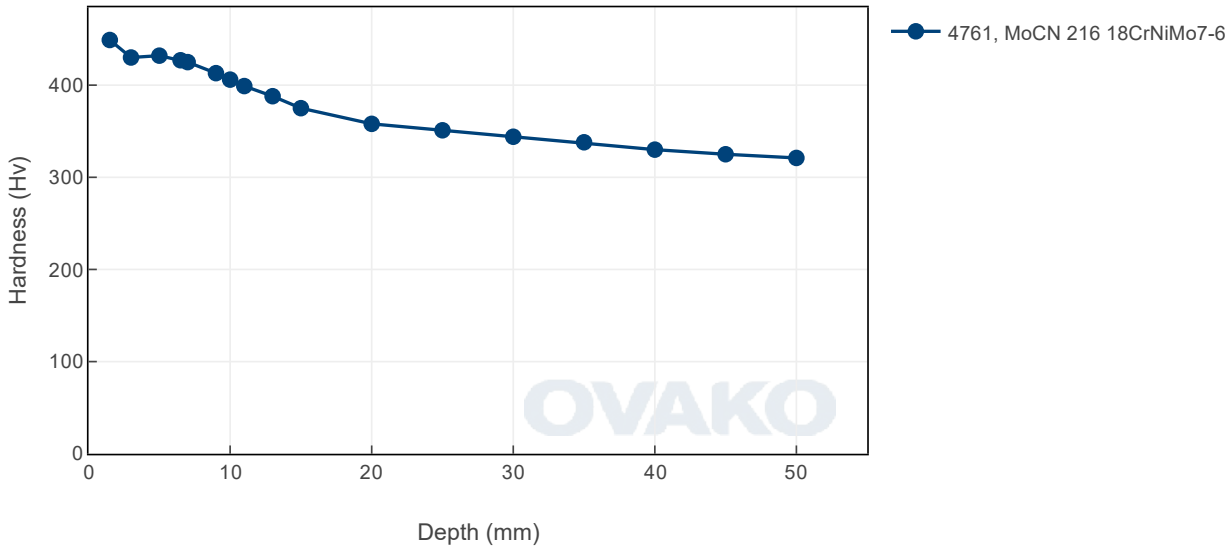
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



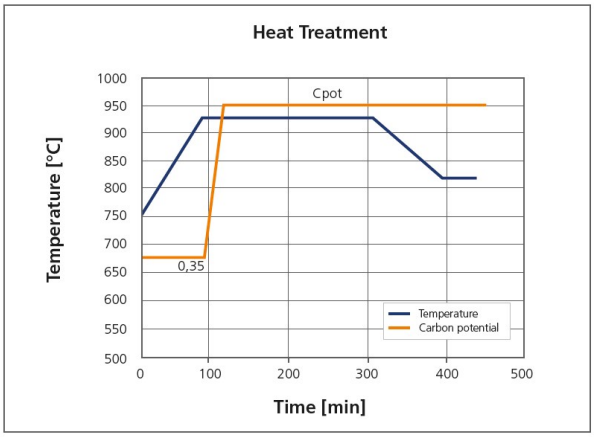
Tempering Diagram (strength)

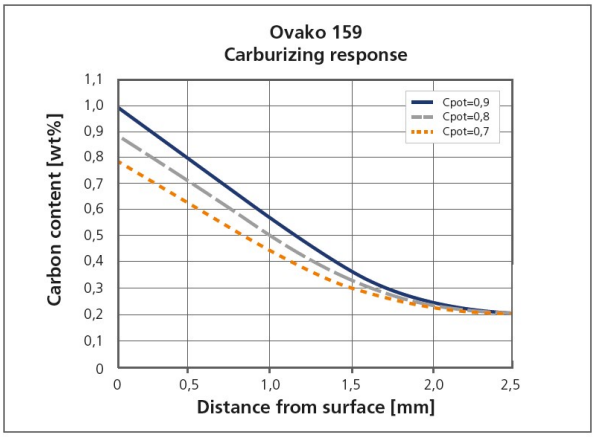


Jominy


Hardness (Hv)
400
300
200
100
0
0
10
20
30
40
50
Depth (mm)
4761, MoCN 216 18CrNiMo7-6

Carburizing response - Ovako 159





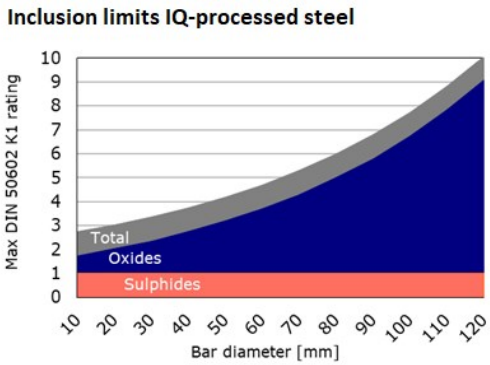
Carburization response for Ovako 159 for the cycles shown in the left figure.

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)
159	Round bar	+AR	874
159	Round bar	+FP	880
159	Tube,wall	+AR	919
159	Tube,wall	+FP	922
4761, MoCN 216	Round bar	+AR	792

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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

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