Material data sheet
Steel grade

Last revised: Mon, 27 Nov 2023 15:12:19 GMT

16NiCr6-4* All

General Information

Ovako 147Q is a high cleanliness case hardening steel suitable for demanding powertrain applications. The grade is produced in Ovakos highest cleanliness level, isotropic quality (IQ), to ensure a minimum of oxidic and sulphidic inclusions.

** 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

18NiCr5-5

Chemical composition

Variant	Cast	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %	V %
147Q	IC	CEV 0.72_{max}	Min	0.13	0.10	0.60	-	-	0.90	1.20	-	-
		Pcm 0.35_{max}	Max	0.18	0.40	0.85	0.015	0.002	1.20	1.50	0.10	0.100

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Elongation A_5 [%]	Hardness
147Q	+A	Round bar	24 < 120	-	-	-	< 230 HB
	+QT	Round bar	30 < 63	540	740-1130	10	220-315 HB

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

Transformation temperatures

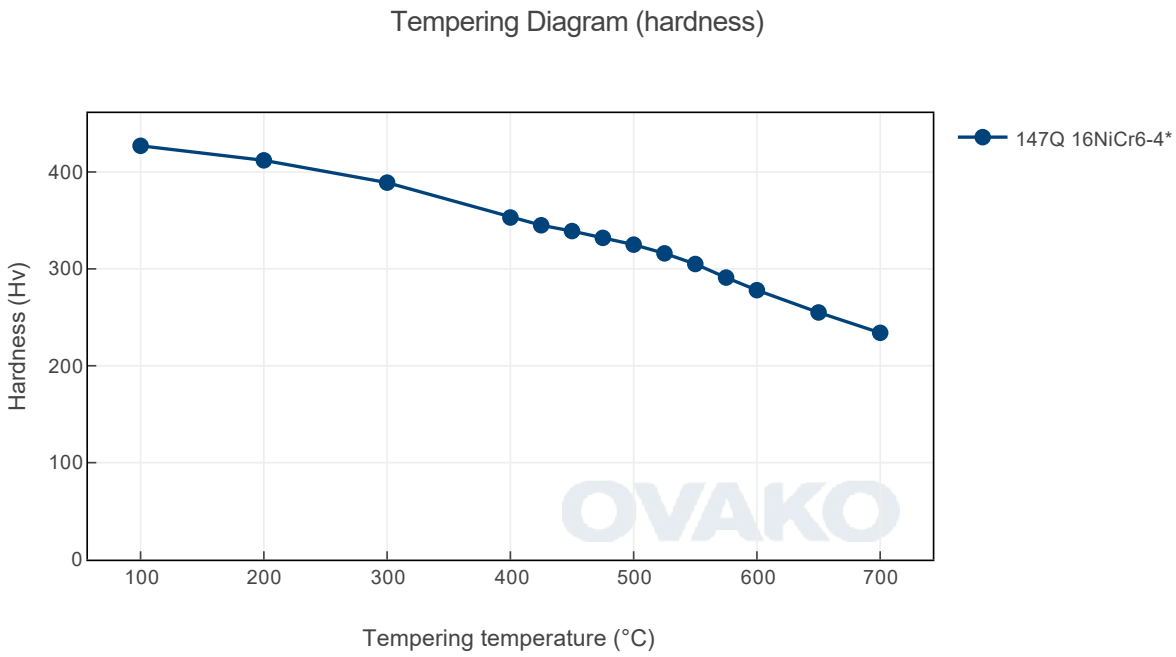
	Temperature °C
MS	403
AC1	719
AC3	814

Heat treatment recommendations

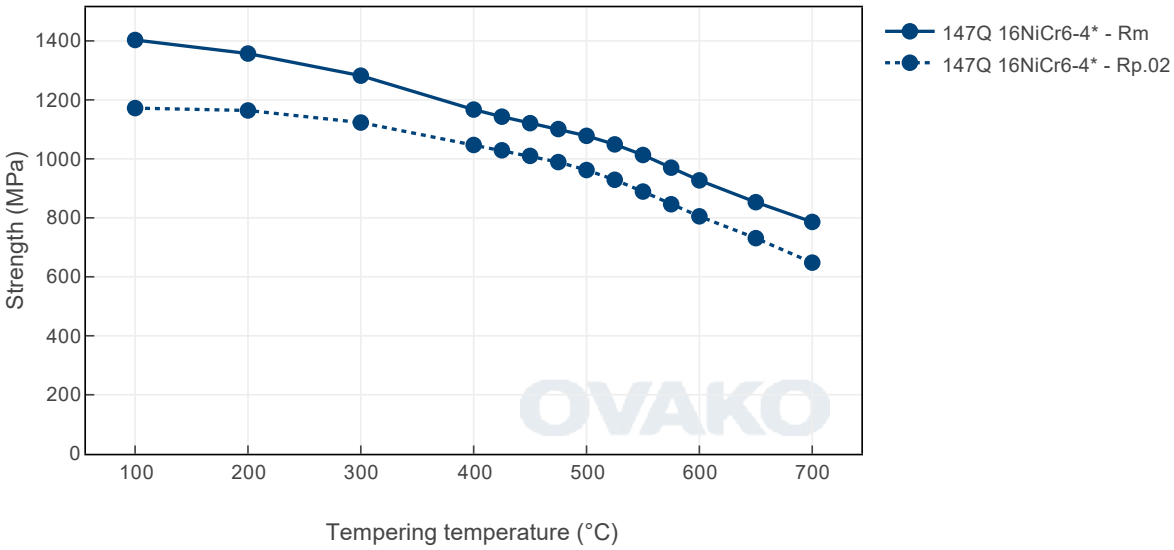
Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+U	800-1200°C	In air
Normalizing	+N	860-890°C	In air
Soft annealing	+A	600-670°C / 2h	In air
Carburizing	+C	850-930°C Carbon potential see diagram	
Hardening	+QT	840-890°C	In oil
Hardening	+QT	780-830°C Hardening of as-carburized component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

Heat Treatment Guide generated Graphs

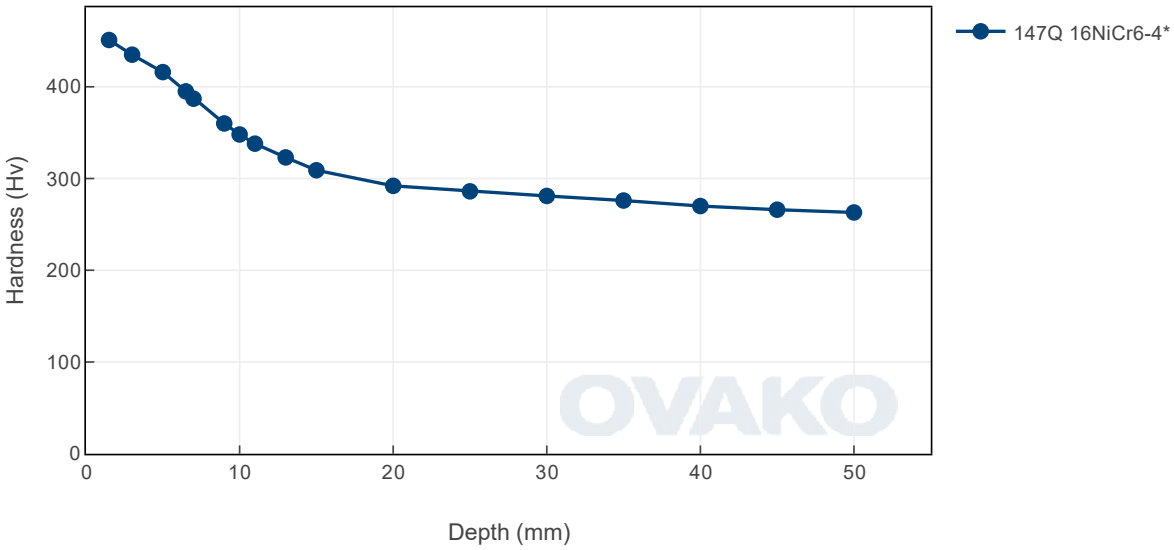
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



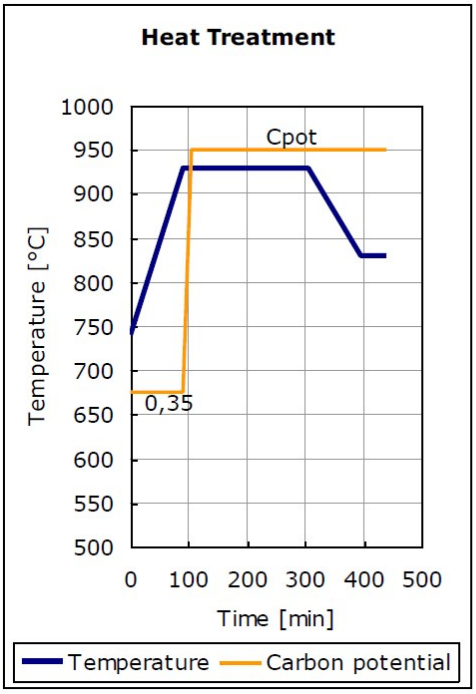
Tempering Diagram (strength)

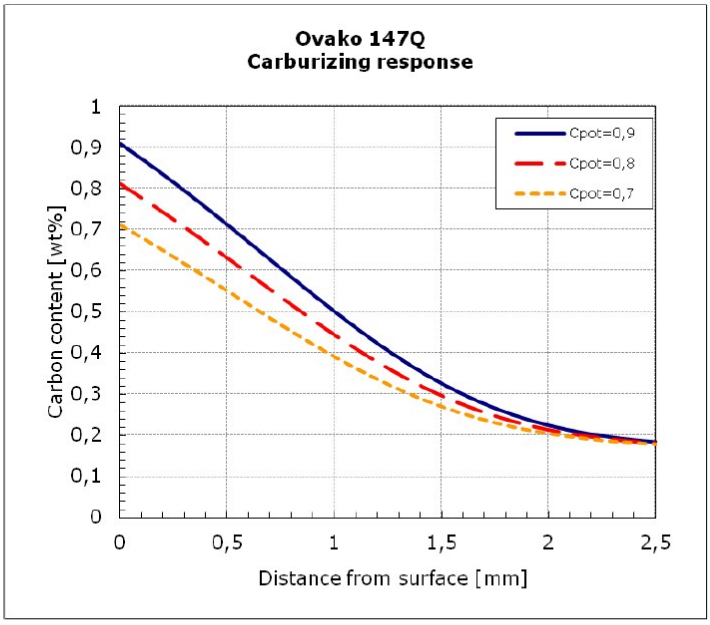


Jominy


147Q 16NiCr6-4*
Hardness (Hv)
400
300
200
100
0
0
10
20
30
40
50
Depth (mm)
OVAKO

Case carburizing response - Ovako 147Q





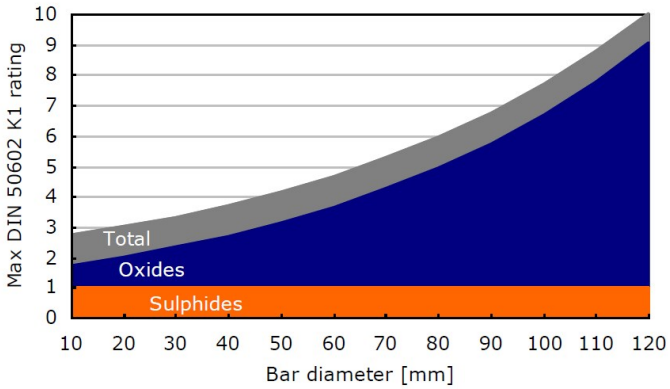
Carburization response for Ovako 147Q for the cycles shown

Steel cleanliness - Ovako 147Q

Micro inclusions - IQ	
Applied standard	DIN 50602 K1
Sampling	Six random samples from the final product dimension
Limits	The limit is dimension dependent. The average rating of six samples should not exceed the limits given in graph.

Macro inclusions – IQ		
Applied standard	ISO 3763 (Blue fracture)	10MHz UST (Ovako internal procedure)
Sampling	Statistical testing on billets	
Limits	<1mm/dm^2	< 10 defects/dm^3 >0,2mm FBH

Inclusion limits IQ-processed steel



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_2 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
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)
147Q	Round bar	+AR	815	422
147Q	Round bar	+SA	821	424
147Q	Tube,wall	+AR	860	459
147Q	Tube,wall	+SA	861	459

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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

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/