

28NiCrMnMo14-6-4* All

General Information

Ovako 455 is a high strength quench and tempering steel with good toughness and good dimension stability. Ovako 455 is used in the mining and construction industry.

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

Chemical composition

Variant	Cast	Weldability		C %	Si %	Mn %	P %	S %	Cr %	Ni %	Mo %
455A	IC	CEV 1.21 _{max}	Min	0.24	0.20	0.85	-	-	1.35	3.40	0.30
		Pcm 0.56 _{max}	Max	0.29	0.35	1.05	0.015	0.010	1.75	3.90	0.45

Transformation temperatures

	Temperature °C
AC1	686
AC3	767

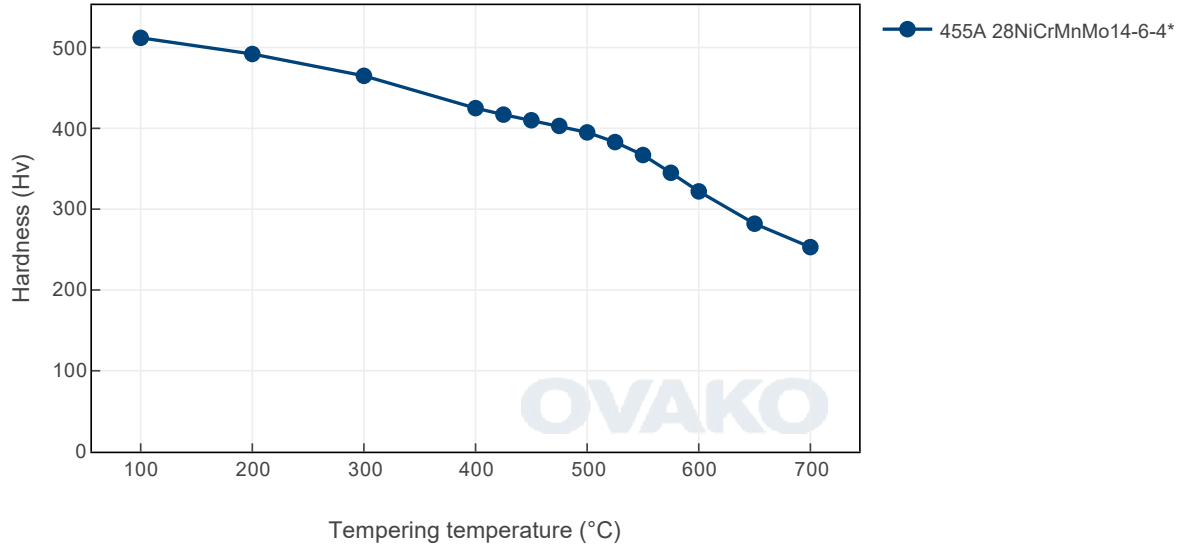
Heat treatment recommendations

Treatment	Condition [ⓘ]	Temperature cycle	Cooling/quenching
Hot forging	+AR	850-1100°C	In air
Normalizing	+N	900-950°C	In air
Annealing	+A	650-730°C	In air
Hardening	+Q	840-890°C	In oil
Tempering	+T	160-700°C See tempering diagram	In air

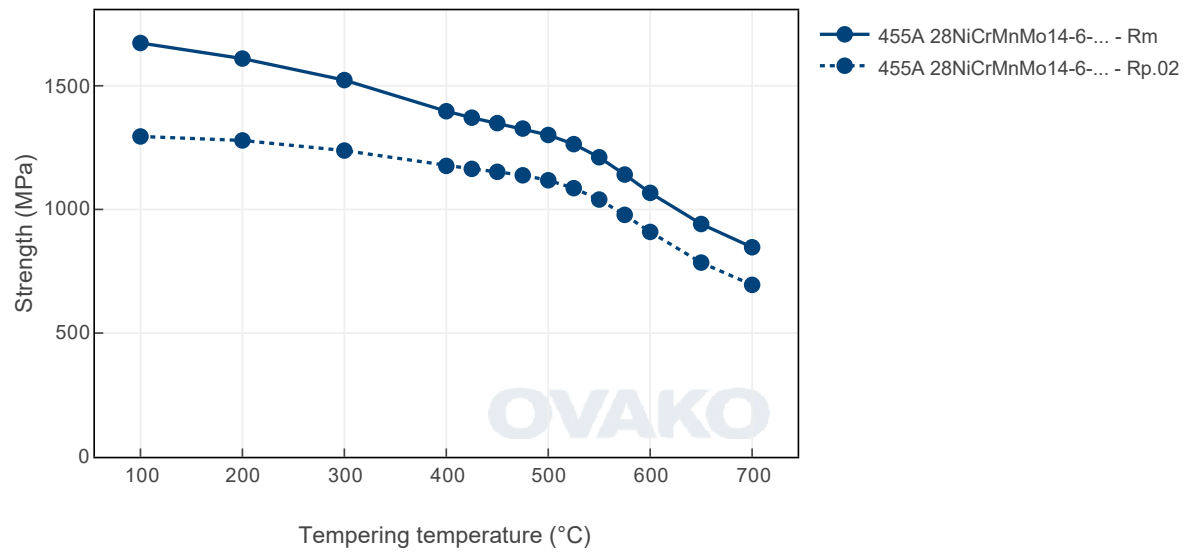
Heat Treatment Guide generated Graphs

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.

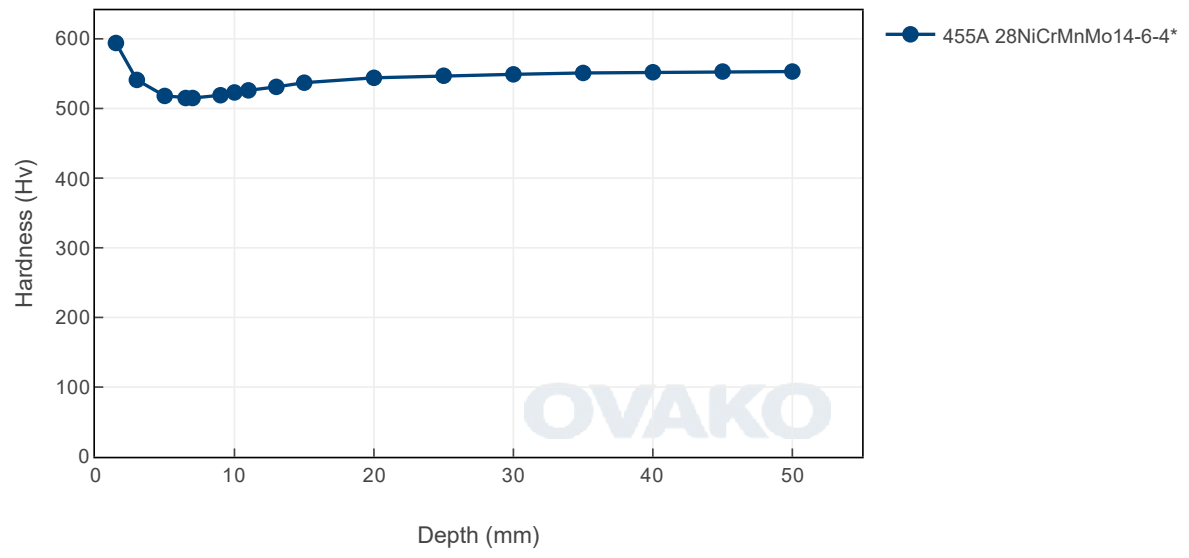
Tempering Diagram (hardness)



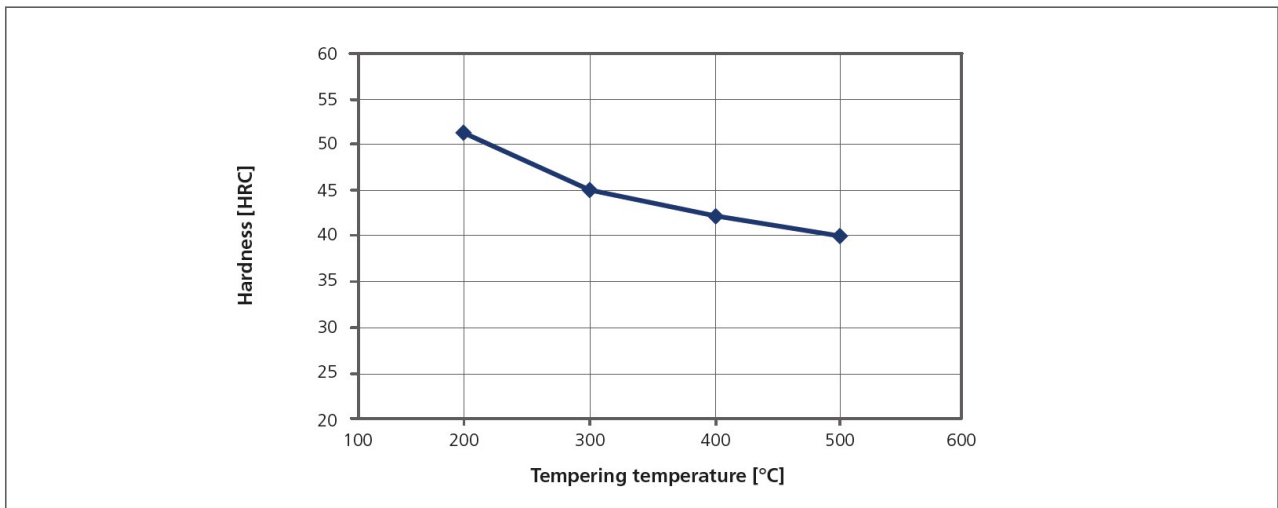
Tempering Diagram (strength)



Jominy

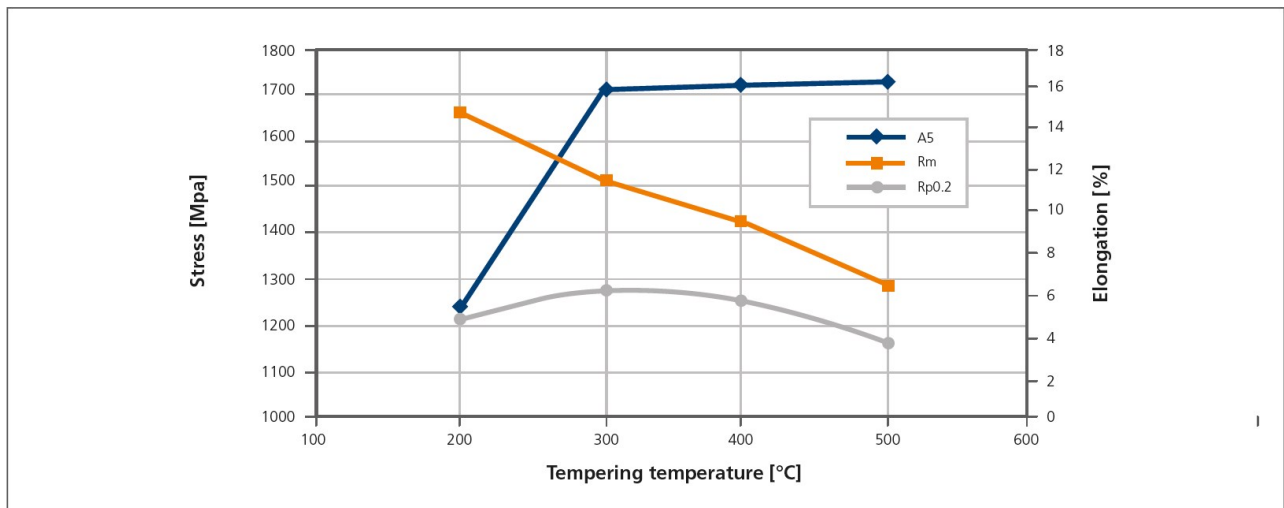


Tempering response - Ovako 455A



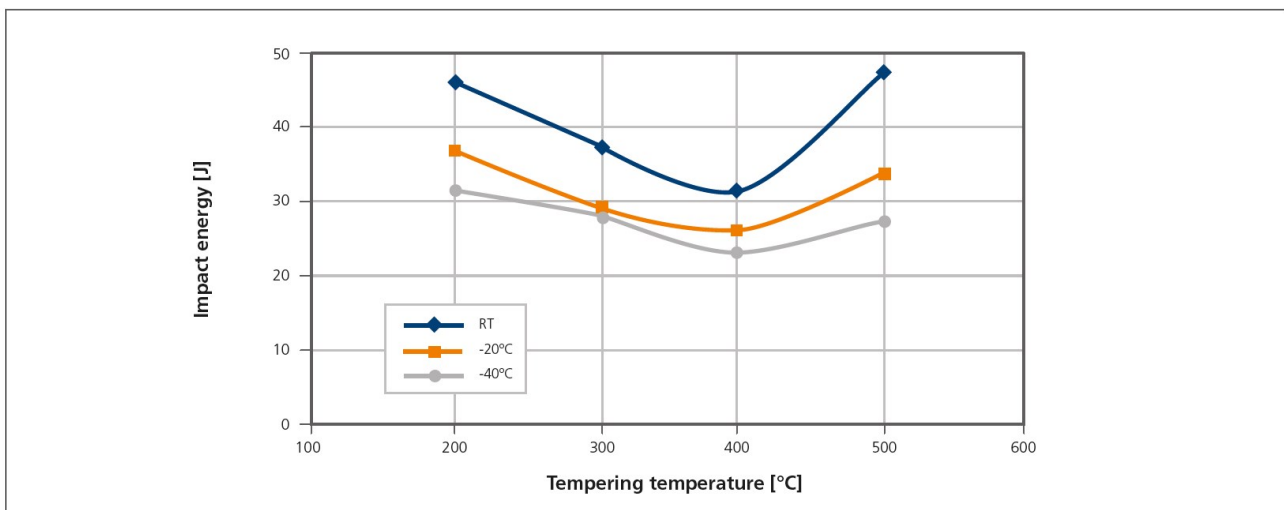
Austenitized at 860°C 30 min, quenched in oil. Tempered 1h at each temperature level.

Mechanical properties - Ovako 455A



Austenitized at 860°C 30 min, quenched in oil. Tempered 1h at each temperature level.

Impact toughness (Charpy-V) - Ovako 455A



Austenitized at 860°C 30 min, quenched in oil. Tempered 1h at each temperature level.

Steel cleanliness

Micro inclusions - steel grade Ovako 455A									Macro inclusions - 455A	
Applied standard	ASTM E45								Applied standard	ISO 3763 (Blue fracture)
Sampling	ASTM A295								Sampling	Statistical testing on billets
Maximum average limits	A		B		C		D		Limits	< 5 mm/dm ²
	Th	He	Th	He	Th	He	Th	He		
	2.5	1.5	1.0	0.5	0	0	0.5	0.5		

SUSTAINABILITY-ENVIRONMENTAL IMPACT DATA

RUTA 1:

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 CO₂ 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 ₂ e/kg	120	62	76

To get the full picture of our products environmental impact we have to look at all of our CO₂ 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 ₂ e kg /1000 kg steel)	Climate compensated Net emission = Scope 3 (CO ₂ e kg /1000 kg steel) Scope 1 - 2 = 0 (compensated)
455A	Round bar	+AR	1232	836
455A	Round bar	+QT	1239	840

As of 1 January 2022 we use carbon offset for all our scope 1- 2 emissions, so in practice the climate compensated data is the same as the full Scope 3 level.

All above data are to be seen as typical values for the specified format and condition. Detailed information about your specific product please contact your sales contact.

Other properties (typical values)

Youngs module (GPa)	Poisson ´s ratio (-)	Shear module (GPa)	Density (kg/m ³)
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 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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Via telephone: +46 8 622 1300

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

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