Material data sheet
Steel grade

Last revised: Mon, 23 Oct 2023 13:13:51 GMT

OVAKO

48CrMoNi4-10* All

General Information

Ovako 495 is a high strength quench and tempering steel with high wear resistance, good toughness and good dimension stability. The steel can be tempered at high temperatures and still maintain a high hardness and high strength. It is microalloyed to obtain a precipitation hardening effect. The through hardenability corresponds to a bar with approximate Ø100mm (oil quenched). Ovako 495 is mainly used for drill heads. Ovako 495 can be supplied as ingot cast (IC) or continuous cast (CC) steel.

For additional Heat Treatment Data, please visit the Heat Treatment Guide.

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

Similar designations

A579 (23)

Chemical composition

Variant	Cast	Di		C%	Si%	Mn%	P%	S%	Cr%	Ni%	Mo%	V%
495B	IC		Min	0.47	0.20	0.75	-	0.015	1.05	0.43	0.93	0.100
			Max	0.50	0.30	0.85	0.015	0.020	1.20	0.50	1.00	0.130
6521	CC	16.9	Min	0.46	0.15	0.70	-	0.010	1.00	0.40	0.90	0.100
			Max	0.50	0.30	0.85	0.015	0.025	1.20	0.50	1.00	0.140

Mechanical Properties

Variant	Condition	Format	Dimension [mm]	Yield strength min [MPa]	Tensile strength [MPa]	Hardness
495B	+QT	Round bar	< 50	1050**	1300 typical	42 HRC typical
6521	+A	Round bar	25 < 160	-	-	< 260 HB

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

Transformation temperatures

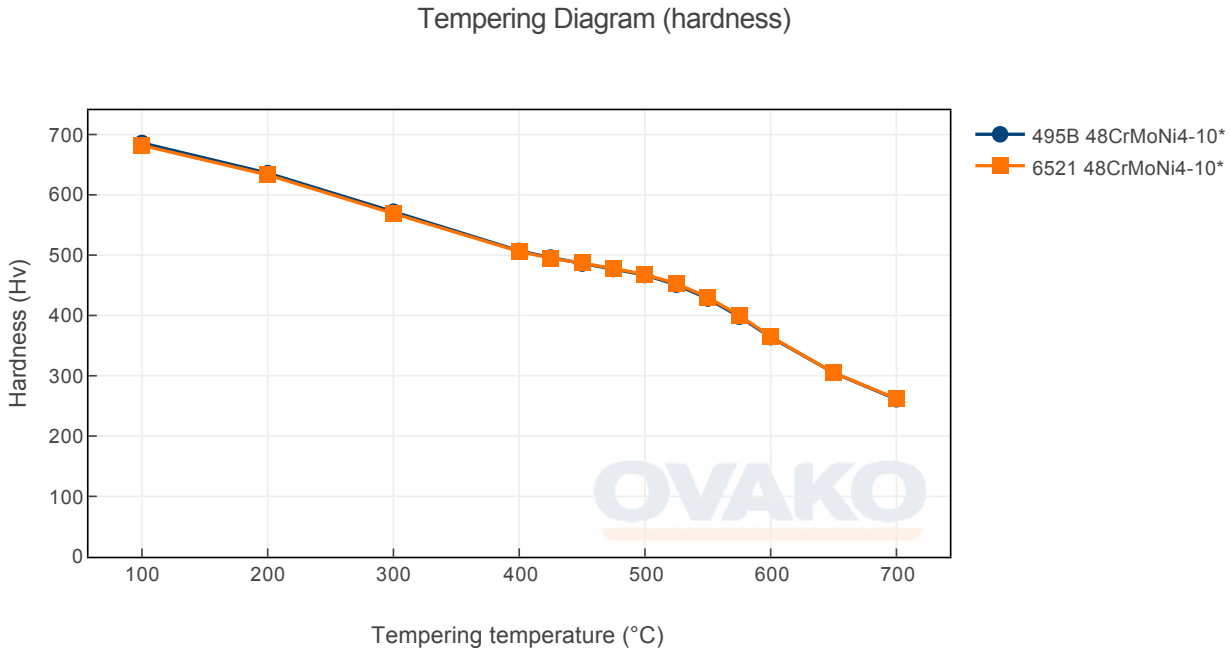
	Temperature °C
MS	283
AC1	733
AC3	808

Heat treatment recommendations

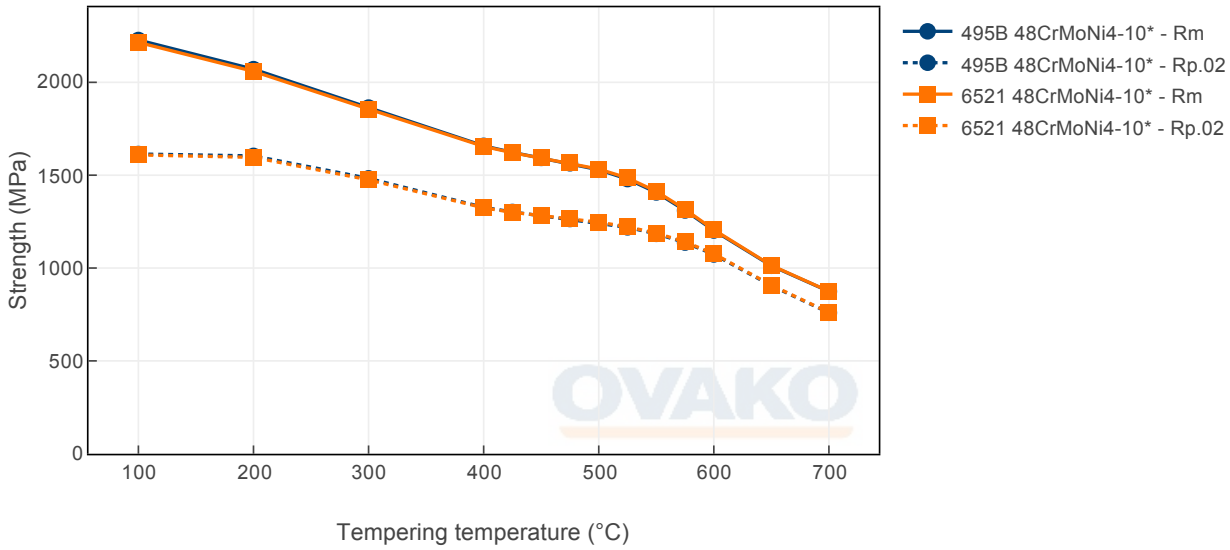
Treatment	Condition	Temperature cycle	Cooling/quenching
Hot forging	+AR	850-1100°C	In air.
Normalizing	+N	900-950°C	In air
Annealing	+A	650-730°C	In air
Hardening	+Q	840-890°C	In oil
Tempering	+T	160-700°C	In air

Heat Treatment Guide generated Graphs

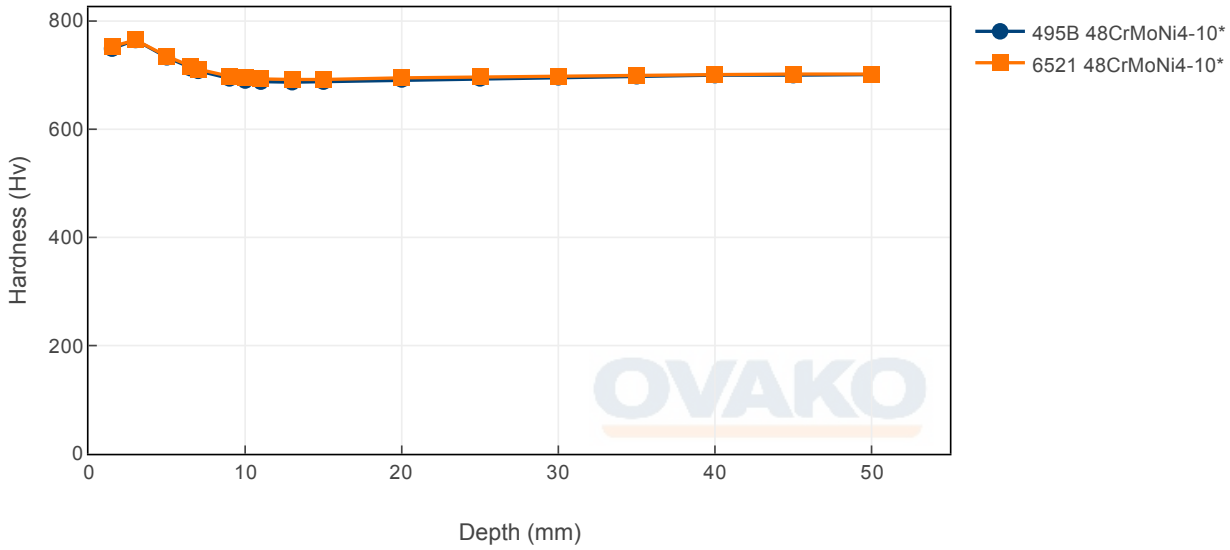
The following graphs are generated from a theoretical model. For further info see the Heat treatment guide module. Select a specific grade version for individual display.



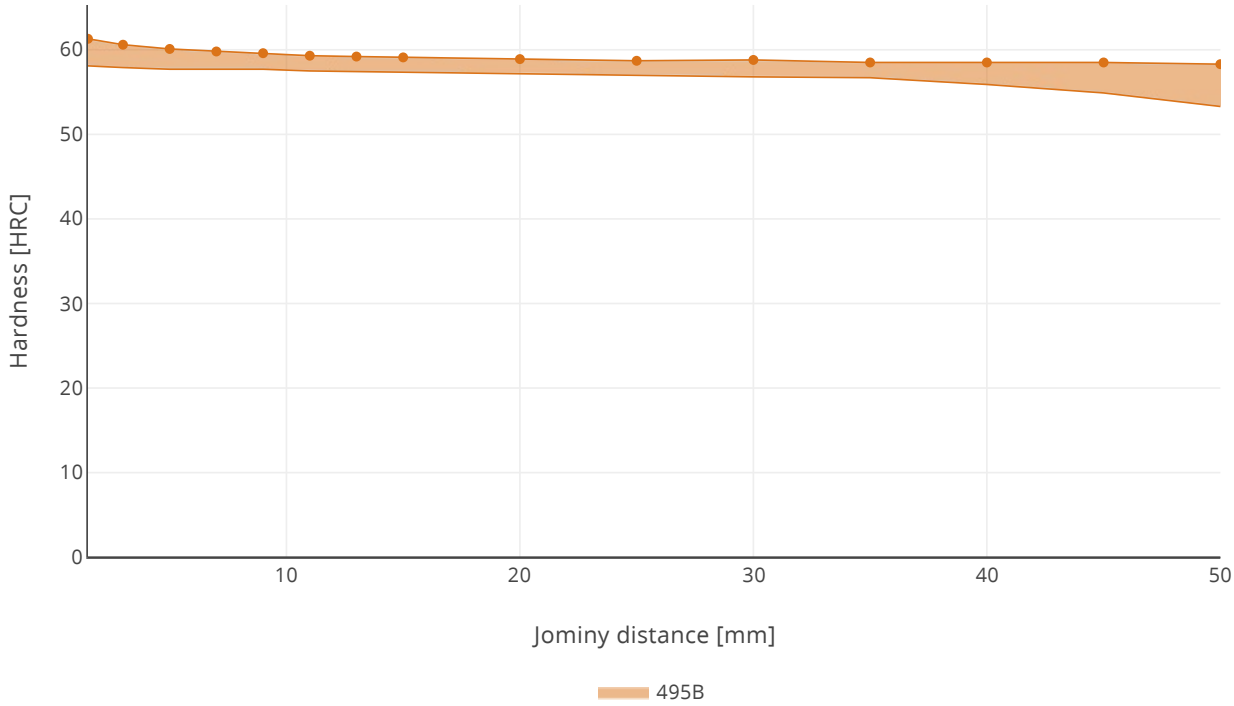
Tempering Diagram (strength)



Jominy


800
600
400
200
0
Hardness (Hv)
0
10
20
30
40
50
Depth (mm)
495B 48CrMoNi4-10*
6521 48CrMoNi4-10*
OVAKO

Hardenability



Jominy hardenability of Ovako 495B. Average value with +/- std deviation.

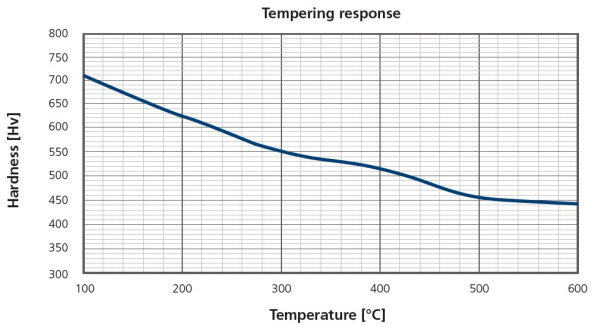
Steel cleanliness - IC

Micro inclusions										**Macro inclusions**	
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			
	2,0	1,5	1,0	0,5	0	0	0,5	0,5			

Steel cleanliness - CC

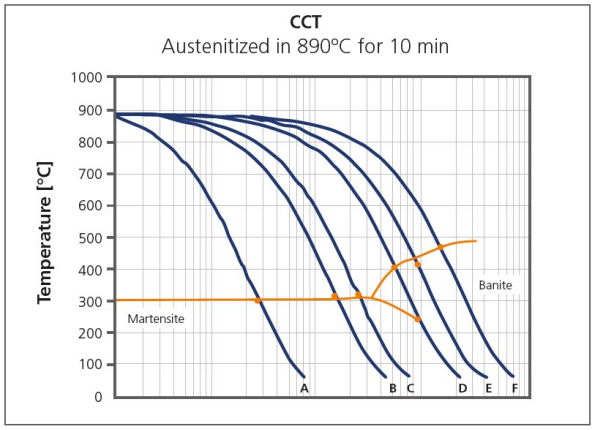
Micro inclusions										**Macro inclusions**	
Applied standard	ASTM E45									Applied standard	ISO 3763 (Blue fracture)
Sampling	ASTM A295									Sampling	Statistical testing on billets
Maximum average limits	A		B		C		D			Limits	< 5 mm/dm^2
	Th	He	Th	He	Th	He	Th	He			
	1,5	1,5	1,0	1,0	0	0	1,0	0,5			

Tempering response



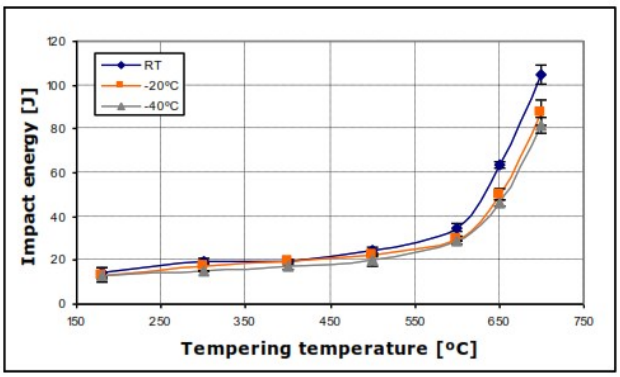
Austenitized at 860°C quenched in oil. Tempered 1h at each temperature level.

CCT



	A	B	C	D	E	F
t_{8-5} [s]	10	60	100	300	500	1000
Hv_{30}	731	686	676	636	552	441

Impact toughness, Ovako 495B (Charpy-V)



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

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)
495B	Round bar	+AR	739	340
495B	Round bar	+A	743	342
495B	Tube,wall	+AR	767	365
495B	Tube,wall	+A	767	365
6521	Round bar	+A	650	350

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/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/

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