

STEEL GRADE

Last revised: Tue, 28 Jan 2025 16:20:38 GMT

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 |

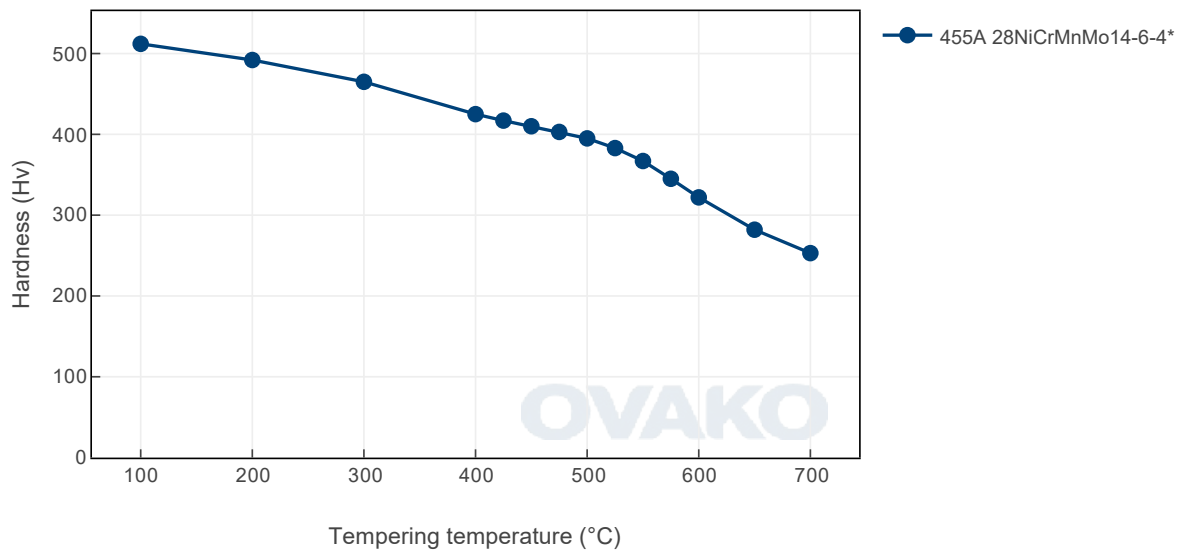
Heat treatment recommendations

| 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 |

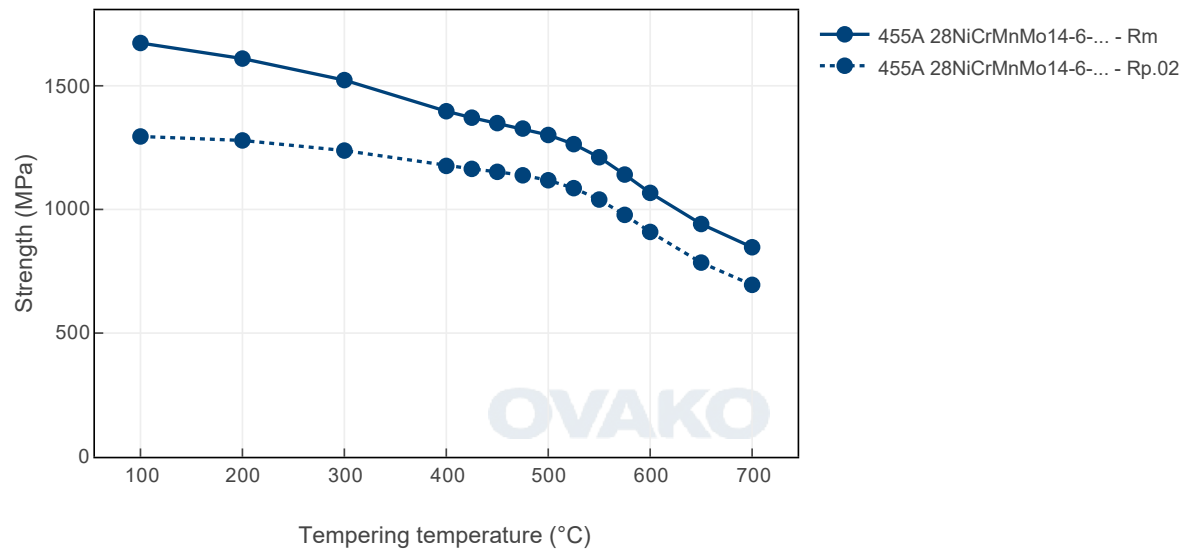
Heat Treatment Guide generated Graphs

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.

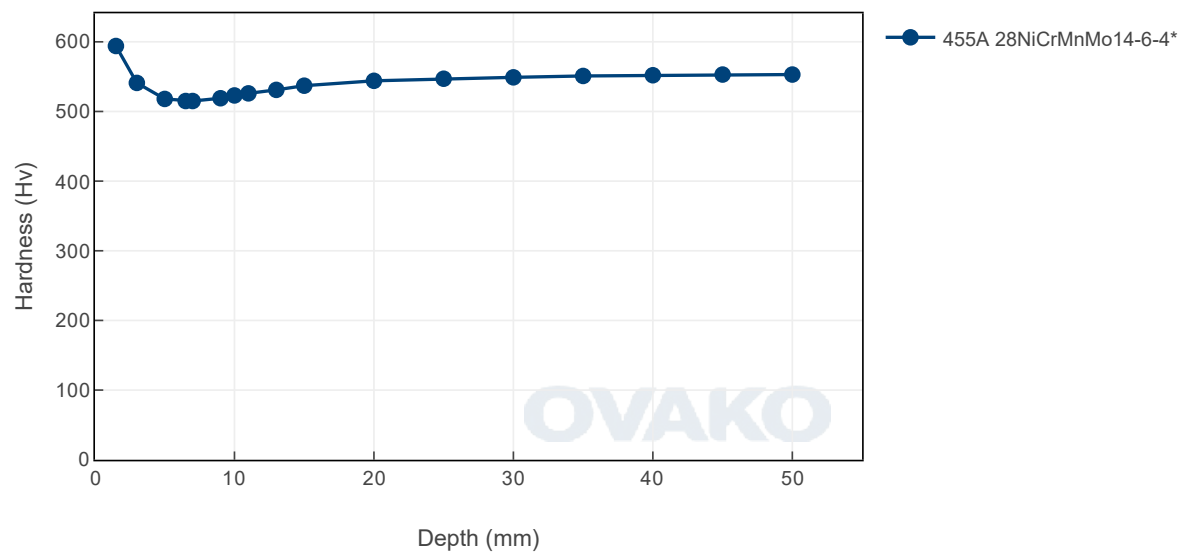
Tempering Diagram (hardness)



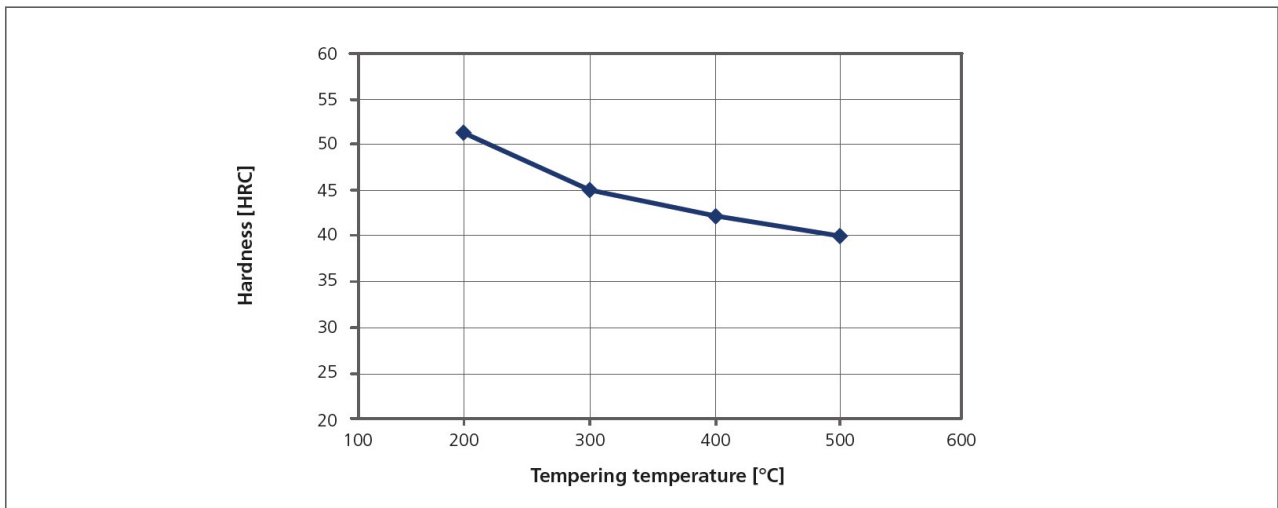
Tempering Diagram (strength)



Jominy

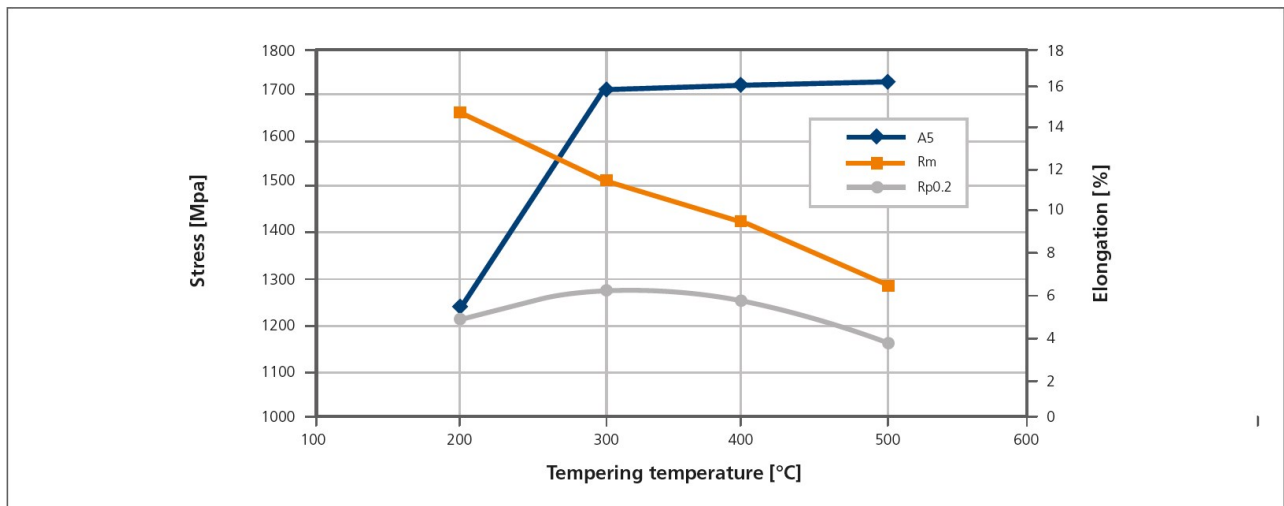


Tempering response - Ovako 455A



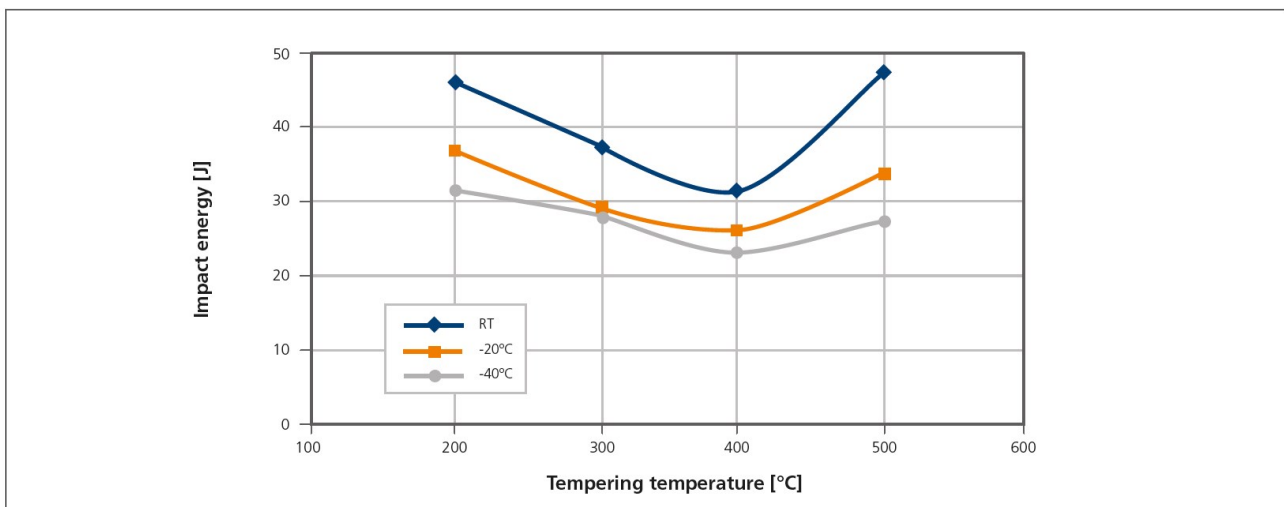
Austenitized at 860°C 30 min, quenched in oil. Tempered 1h at each temperature level.

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 | | |
| | Th | He | Th | He | Th | He | Th | He | |
| | 2.5 | 1.5 | 1.0 | 0.5 | 0 | 0 | 0.5 | 0.5 | |
| Limits | | | | | | | | Limits | < 5 mm/dm ² |

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 |
|----------------------|--------|--------------|--------|
| 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 | 1224 | 825 |
| 455A | Round bar | +QT | 1233 | 832 |

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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