# NIROSTA® 4116

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|---|---|---|---|
| **Material no.** | 1.4116 to EN 10 088-2 | | |
| Code names | D | (DIN/EN) | X 50 CrMoV 15 |
| | USA | (ASTM) | – |
| | Japan | | – |
| | CIS | | – |

**Chemical composition** (in % by weight)[1)]

| | C | Cr | Mo | V |
|---|---|---|---|---|
| min. | 0.45 | 14.0 | 0.5 | 0.1 |
| max. | 0.55 | 15.0 | 0.8 | 0.2 |

[1)] Special arrangements may be made within the analysis limits depending on the properties required.

**Product forms** Hot-rolled wide strip, cold-rolled wide strip, slit strip, cut sheets, circles, blanks

**Mechanical properties** (transverse samples) at room temp.[2)] to EN 10 088-2

| Dimensions range | $R_m$ (tensile strength) N/mm² | $A_5$ (elongation) % | $A_{80}$ (elongation) % | Hardness HB |
|---|---|---|---|---|
| Cold-rolled strip s ≤ 8 mm<br>Hot-rolled strip s ≤ 13.5 mm | max. 850 | ≥ 12 | ≥ 12 | ≤ 280 |

[2)] Hardened and tempered approx. 55 HRC. Calculating tensile strength from hardness is subject to wide fluctuations.

**Heat treatment** Hardened

| Hardening temperature °C | Cooling | Microstructure |
|---|---|---|
| 980 – 1050 | Oil/air | Martensite (transformation structure) |

**Physical properties**

| Density kg/dm³ | Modulus of elasticity in kN/mm² at | | | | | Thermal expansion in $10^{-6} \cdot K^{-1}$ between 20 °C and | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 20 °C | 100 °C | 200 °C | 300 °C | 400 °C | 100 °C | 200 °C | 300 °C | 400 °C |
| 7.7 | 215 | 212 | 207 | 200 | 190 | 10.5 | 11.0 | 11.0 | 11.5 |

| Thermal conductivity at 20 °C W/m · K | Specific heat capacity at 20 °C J/kg · K | Electrical resistivity at 20 °C Ω · mm²/m | Magnetisability |
|---|---|---|---|
| 30 | 460 | 0,65 | present |

**Surface finish** 1 E (II a), 2 B (III c), 2 R (III d), 2 G (IV)

**Edge finish** Untrimmed, cut edges, dressed edges on request

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|---|---|---|
| **Chemical resistance** | Our publication "Chemical Resistance of NIROSTA® Steels" contains tables giving some guide to chemical resistance. | NIROSTA® 4116 belongs to group 1 in the publication. |
| **Processing** | This material can be heat treated to achieve high strength values due to its high C content.<br><br>Heat tints or scale from heat treatment reduce corrosion resistance and should be removed chemically (e.g. pickling baths or pickling pastes) or mechanically (e.g. by grinding or blasting with glass beads or iron- and sulfur-free quartz sand). | Machining is comparable to that of an unalloyed structural steel.<br>Tools should be made of good quality high-speed steel or carbide.<br><br>NIROSTA® 4116 can be polished. |
| **Welding** | Weldability:<br>NIROSTA® 4116 is not suitable for welding. | |
| **Applications** | NIROSTA® 4116 is used for parts which are subject to wear, e.g. for high-quality table and kitchen knives, penknife blades and meat knives. Adding vanadium improves wear resistance. The addition of Mo improves corrosion resistance compared to standard martensitics. | |