



CHRONIFER® M-4021 martensitic Hardenable Stainless Steel

Material No.	DIN Abbreviation	AFNOR	AISI/SAE/ASTM	ISO	Euro Standard EN	Others
1.4021	X20Cr13	X20Cr13 (former Z 20 C 13)	AISI 420 AISI 420A ASTM F899	7153-1 (B)	X20Cr13	NF S 94-090 JIS ~ SUS 420J1

Distinctive feature & main attribute: a rustproof, temperable stainless chromium steel alloy whose corrosion resistance can only be achieved by tempering its parts. For a greater achievement, the parts must be well polished. Due to its low sulphur and carbon content, this quality is even better non-corroding than 1.4034 or 1.4035.

Use & application range: this material is suitable not only for medical and dental technologies such as tweezers and forceps but turbine blades, axes, shafts, pump components, ship's propellers, spindels and poppets.

REFERENCE ANALYSIS %	C	Si	Mn	P	S	Cr	Ni	Fe
	0.16 0.25	max. 1.00	max. 1.00	max. 0.04	max. 0.03	12.00 14.00	max. 1.00	balance

EXECUTION DELIVERY FORM STANDARD SIZES AVAILABILITY	<ul style="list-style-type: none"> Execution in 3 m (2 m) round bars Standard size in stock: see Product range Other sizes on request
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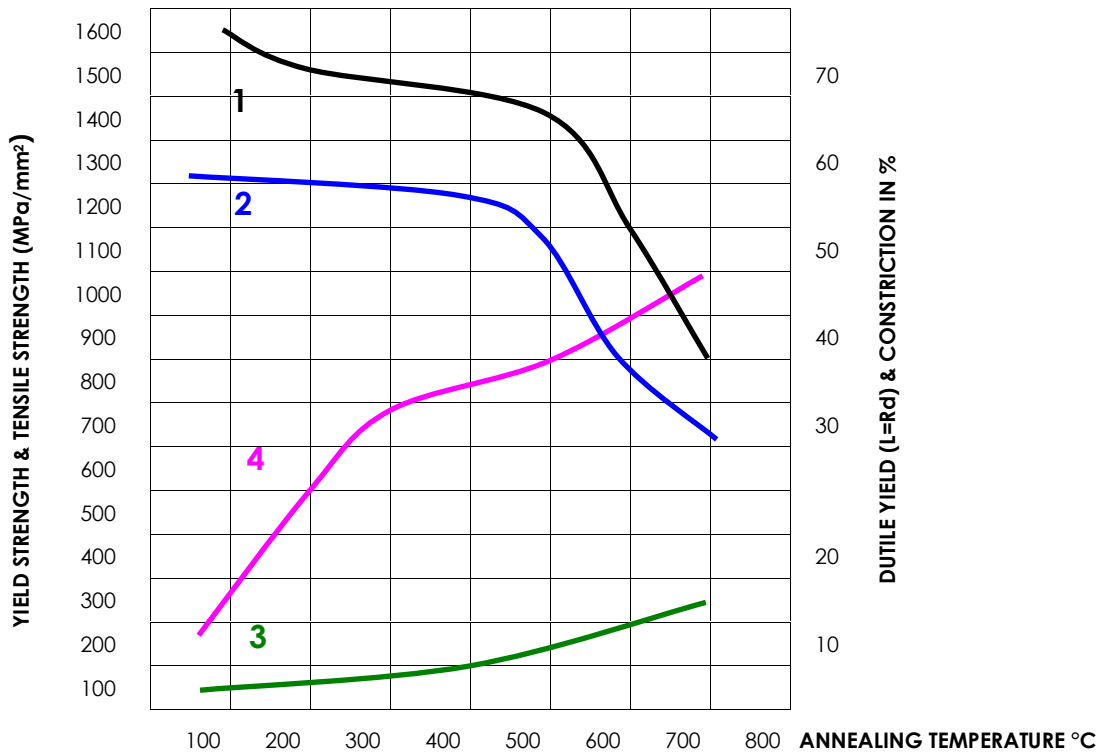
TOLERANCES	<ul style="list-style-type: none"> Ø < 2.00 mm, cold drawn, ground, polished; ISO h8; surface finish Ra 0.4 (N5) Ø ≥ 2.00 mm; ISO h7 (h6) Tighter tolerances on request
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MECHANICAL & ELECTRICAL PROPERTIES	At delivery status: <ul style="list-style-type: none"> Tensile strength (R_m): ~ 950 MPa Hardness after tempering: ~ 47 HRC Electrical resistivity (R) at 20 °C: 0.70 Ω.mm²/m
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HEAT TREATMENT	<ul style="list-style-type: none"> Tempering: 950 – 1050 °C, cooling in oil Annealing: 745 – 825 °C (See chart)
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CUTTING RATES	<ul style="list-style-type: none"> v_c ~ 30 – 40 m/min, long-chipping, value depending on the lubrication oil, cutting tools and shape of parts. Cutting oil: e.g. INOX or ORTHO of Motorex
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CHART OF TREATMENT



- 1: Tensile strength R_m (MPa)
- 2: Yield strength $R_e 0.2$ (mm²)
- 3: Ductile yield $A \epsilon$ (%)
- 4: Constriction Z (%)

If your harden in oil, we recommend to not pass over the annealing temperature of 820 °C to avoid cracks. The water should be pre-heated at about 50 °C. The above curves indicate the results of determinate section of a curtain size of 5 mm. The result after heat treatment can be slightly different than shown on this curve, depending on the shape and size of the part.