Alleima® 4C27A free-cutting medical wire
Wire
Datasheet

Alleima® 4C27A is a hardenable stainless chromium steel alloyed with molybdenum. This grade is supplied in wire form.

It is characterized by:

- Very good machinability
- High wear resistance
- Good toughness
- Good corrosion resistance due to addition of molybdenum

Alleima® 4C27A is used for the manufacture of precision components such as watch parts, measuring points, dental tools, precision instruments and drilled surgical needles.

Standards

- ASTM: 420F Mod
- DIN: X 22 CrMoNiS 13 1

Product standard

ASTM F899

Applications

Alleima® 4C27A is a hardenable grade used for medical and dental tools as dental burrs, dental drills, bone drills, dental taps, reamers, screw drivers and drilled surgical needles.

Chemical composition (nominal) %

C	Si	Mn	P	S	Cr	Ni	Mo
0.22	0.6	1.3	≤0.030	0.2	13	0.8	1.2

Mechanical properties

Forms of supply/ finishes	Diameter	Tensile strength	Proof strength	Elongation
		R_m [1)]	$R_{p0.2}$ [1) 2) 3)]	A [1) 3)]

	mm	MPa	MPa	%
Wire in coils:				
Annealed	0.6-3.0	<800	450	25
Drawn	0.45-4.0	950	770	10
Straightened wire:				
Annealed	0.6-10.0	<800	450	25
Drawn	0.6-3.0 >3.0-5.0 >5.0-10.0	950 950 850	770 770 650	10 10 11
Drawn/ground	0.6-3.0 >3.0-5.0 >5.0-10.0	950 950 850	770 770 650	10 10 11
Annealed/ground	0.6-10.0	<800	450	25

1) Nominal values. Other properties on request.
2) Corresponds to 0.2 % proof strength.
3) $R_{p0.2}$ and elongation values are given for information only.

Physical properties

Density (annealed) **:** 7.8 g/cm^3, 0.28 lb/in^3
Resistivity Cold drawn : 670 µΩm
Heat treated : 740 µΩm

Thermal expansion

Temperature	20-100	20-200	20-300
Cold dawn	10.5	11.0	11.5
Heat treated	11.0	11.5	11.5

1) Mean values in temperature ranges (x10^{-6})

Alleima® 4C27A is a magnetic material.

Heat treatment

Soft-annealing

When required, soft-annealing should be conducted for a period of one hour at a temperature of 650-680°C.

Hardening

Diameter	Temperature	Soaking time	Quenching 1)
mm	**°C**	**approx. min.**	
<6	1030-1050	3-6	in oil at 50 °C

>6	1030-1050	6-10	in oil at 50 °C

1) Diameter <2 mm may also be cooled in air or, to prevent oxidation, in a protective gas.

The smaller the dimensions, the shorter the soaking time. To prevent oxidation and decarburization, hardening should be carried out in a protective gas atmosphere using nitrogen, argon or vacuum.

Tempering

Temperature 100-350°C
Temperatures below 350°C are recommended for the retention of favorable corrosion resistance.
Tempering time 30-60 min.

The core of the material should have a tempering time of at least 30 min. To reduce the risk of cracking tempering should be conducted immediately after hardening. The heating rate should not be too high, particularly in the case of intricately shaped components.

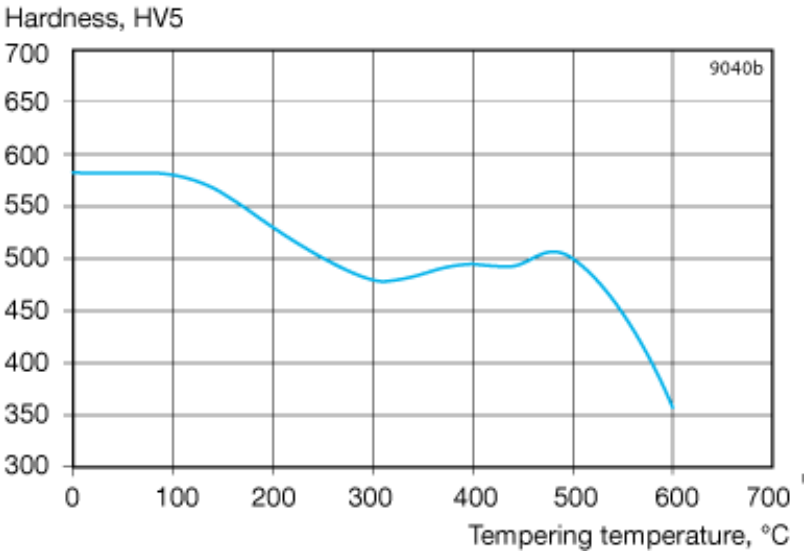

Figure 1. Hardness after recommended hardening procedures, valid for all dimensions.
Soaking time 30 minutes.

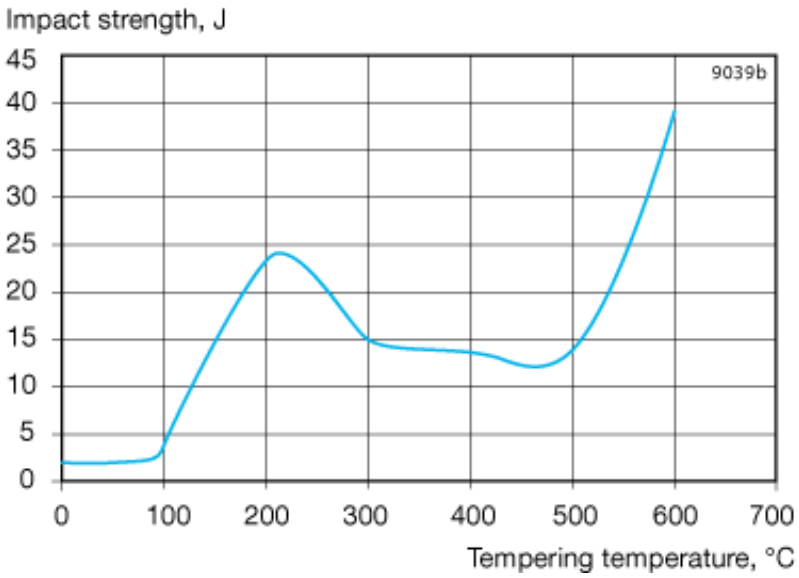

Figure 2. Hardness after recommended hardening procedures, valid for all dimensions.

Soaking time 30 minutes. Standard Charpy V specimens at 20°C.

Disclaimer:

Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Alleima materials.

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