Heraeus AMLOY

AMORPHOUS ALLOYS
AMLOY-NI01

MATERIAL PROPERTIES

- Extremly high strength and fracture toughness
- High surface quality
- High hardness and low abrasion
- High wear and corrosion resistance
- Biocompatibility
- Isotropic behaviour

CHEMICAL COMPOSITION

Element	Concentration (wt%)
Ni	balance
Nb	49

DESIGN GUIDE & APPLICATIONS

- Min. wall thickness: 200 µm
- Max. wall thickness: up to 1.5 mm
- Component weight: up to 5 g
- Cutting and edging in medical applications
- Small gears
- Mechanical components in the watch industry
- Micromechanics and precision components
- Abrasion-critical components

PROCESSING TECHNOLOGIES

The nickel-niobium-based alloy is currently processed using precision die-casting, which enables the production of small, complex, and thin-walled components with excellent surface quality and tight tolerances. Due to its amorphous nature, the material exhibits lower shrinkage compared to crystalline alloys, enabling highly reproducible manufacturing of precision parts.

We are currently working on processing the alloy using additive manufacturing.

PHYSICAL PROPERTIES

Properties	Typical Value
Density (g/cm^3)	8.5
Liquidus temperature (°C)	1250
Solidus temperature (°C)	1190
Glass transition temperature T_g (°C)	650
Crystallization temperature T_x (°C)	700
Crystallization enthalpy ΔH (J/g)	- 63.9
Young‘s modulus (GPa)	124
Poisson‘s ratio	0.39
Bending yield strength (GPa)	4.4
Tensile yield strength (GPa)	2.9
Compressive yield strength (GPa)	3.0
Vickers hardness (HV5)	860
Electrical resistance (Ω mm^2 m^{-1})	~ 1.6
Thermal conductivity (W K^{-1}m^{-1})	~ 10
Lin. coef. of expansion [µm K^{-1}m^{-1}]	~ 10
Specific heat capacity (J kg^{-1}K^{-1})	300

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