

AMORPHOUS ALLOY

AMLOY-ZR03



ENHANCE YOUR PRODUCT PERFORMANCE.

Amorphous alloys, also known as amorphous metals or metallic glasses, are undercooled frozen metallic liquids. They show material properties which normally exclude each other, i.e. high hardness and strength with high elasticity at the same time.

Amorphous alloys enable extended product lifetime through reduced abrasion and corrosion resistance. Through the high strength of the material, they also play an important role in miniaturization. Isotropic behavior enables the simplification of specifications and product designs.

At Heraeus AMLOY, amorphous alloys are processed by injection molding and 3D printing into near-net-shape components at industrial scale.

The zirconium-based alloy **AMLOY-ZR03** is ideally suited for injection molding applications due to its very good glass-forming ability and good viscosity in the liquid state. Thanks to our high level of expertise and technical know-how, Heraeus Amloy is able to produce components in high volumes and within tight tolerances using this alloy on our in-house equipment.

Let's work together to drive your sustainable improvements and solve previously unsolved problems!



CHEMICAL COMPOSITION

Element	Concentration (wt%)
Zr	Balance
Cu	13
Ni	10
Al	4
nb	3

MAJOR MATERIAL PROPERTIES

- High strength combined with excellent elasticity
- High surface quality
- High hardness and low abrasion
- High corrosion resistance
- Isotropic properties

INDUSTRIES & APPLICATIONS

- Aerospace
- Consumer Electronics
- Industrial
- Lifestyle
- Medical Technologies
- Robotics
- Sensors
- Tool Inserts

PHYSICAL PROPERTIES

Properties	Typical Value
Density (g/cm ³)	6.65
Liquidus temperature (°C)	840
Solidus temperature (°C)	815
Glass transition temperature T _g (°C)	400
Crystallization temperature T _x (°C)	498
Crystallization enthalpy ΔH (J/g)	-60
Young's modulus (GPa)	85
Poisson's ratio	~ 0.37
Bending yield strength (GPa)	2.2
Tensile yield strength (GPa)	1.6
Compressive yield strength (GPa)	1.6
Vickers hardness (HV5)	~ 500
Vickers hardness (HV5)	~ 1%
Thermal conductivity (W/mK)	~ 2,5
Thermal expansion coefficient (1/K)	10 - 12 x 10⁻⁶
Specific heat capacity (J/kgK)	~ 290 - 320

ADDITIVE MANUFACTURING

Ideally suited for:

- Production of small to medium quantities
- Complex geometries and large component dimensions

Advantages:

- Use of the material properties of amorphous alloys for weight-optimized design
- Heraeus AMLOY's unique process competence through in-house material production and printing process development

INJECTION MOLDING

Ideally suited for:

- High quantities
- Manufacturing within tight tolerances (± 10 μm)

Advantages:

- Automated production process (24/7 possible)
- Very good surface quality (Ra 0.05 μm)
- Low shrinkage < 0.5%
- Alternative to machining or Metal Injection Molding

