

MIM-4065 Low Alloy Steel

Low Alloy Steel Injection Molding

NEWAY PRECISION WORKS

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Technical Data: MIM-4065

Product Description

Metal injection molding of martensitic 4605 low alloy steel delivers an exceptional combination of high strength, hardness, and corrosion resistance. The alloy contains 17% chromium for good general corrosion performance and molybdenum for enhanced pitting and crevice resistance. Significant carbon and nitrogen additions enable 4605 MIM parts to achieve hardness levels exceeding HRC 60.

The fine, uniform carbide distribution imparted by MIM also provides a refinement in flexibility over conventional 4605 grades. Excellent dimensional stability is maintained during heat treatment. These balanced properties make MIM 4605 suitable for various demanding applications.

With its hardness, strength, corrosion resistance, and excellent manufacturing characteristics, MIM 4605 presents an advanced low alloy steel solution for critical components across industries, including aerospace hydraulic components, measure tool parts, power tool parts, and medical instruments.



Chemical Composition

Element	Carbon (C)	Silicon (Si)	Manganese (Mn)	Phosphorus (P)	Sulfur (S)	Chromium (Cr)	Nickel (Ni)	Molybdenum (Mo)	Iron (Fe)
Percentage	0.02	0.2	0.8	0.015	0.01	16.5	4.5	2	Balance

Physical and Mechanical

Alloys	Status	Tensile Strength	Yield Strength	Impact Strength	Hardness	Young's Modulus	Poisson's Ratio	Elongation	Density
		Mpa	Mpa	J	HRC	Gpa	Ratio	% in 25.4 mm	g/cm ³
MIM 4065	Annealed	800	700	40	45	180	0.28	10	7.7

Typical Properties

Corrosion-Resistant Properties



MIM-4065 low alloy steel boasts exceptional dimensional stability, making it a prime choice for applications demanding precise and consistent dimensions. MIM-4065 maintains its form and size during the metal injection molding, minimizing distortion, warping, and shape alterations. This stability arises from its controlled microstructure and minimal residual stress levels, ensuring that components retain accuracy and functionality post-sintering.

In fields where tight tolerances and exact dimensions are paramount, MIM-4065 low alloy steel excels. Electronics industries use this trait for connectors and housings to ensure consistent, reliable connections. Precision tools, like measuring instruments and gauges, benefit from MIM-4065's stability, maintaining precision during use. Automotive and aerospace sectors employ the material for engine and transmission components, guaranteeing seamless fit and peak performance.

Note

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Typical Properties

Toughness

MIM-4065 low alloy steel exhibits remarkable toughness, ensuring its suitability for applications requiring resistance to impact and sudden loading. Despite its high strength, MIM-4065 maintains good toughness due to its controlled microstructure and alloy composition. The material's ability to absorb energy without fracturing makes it ideal for components subjected to dynamic forces. This toughness prevents catastrophic failures, enhancing the safety and reliability of MIM-4065 low alloy steel products.

Automotive and aerospace industries utilize this material for brackets, connectors, and safety components, where toughness ensures resistance to collisions and vibrations. Tooling and industrial machinery also benefit from MIM-4065's toughness, as it maintains integrity under operational shocks. Furthermore, medical devices, such as surgical instruments, rely on the material's toughness to withstand handling and potential impact during procedures.



Corrosion-Resistant



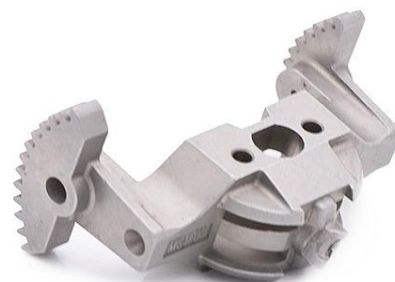
The approximately 16-18% chromium and 2-3% molybdenum content of MIM-4065 imparts good overall corrosion resistance. It performs well in atmospheric and chemical processes environments and against pitting and crevice corrosion attacks. However, MIM-4065 has lower corrosion resistance than austenitic low alloy steel grades. Its corrosion resistance is at the same level as MIM 430. Proper passivation enhances the protective surface film.

MIM-4065 provides sufficient corrosion performance for aerospace, medical, nuclear, chemical processing applications, and other industries where moderate chemical resistance and high hardness and strength are needed. It withstands the operating conditions seen by components like hydraulic valves and fittings, surgical instruments, pumps, and reactors.

Strength

MIM-4065 low alloy steel offers impressive strength properties, making it suitable for demanding applications. With a tensile strength of around 900 MPa and a yield strength of approximately 800 MPa, MIM-4065 exhibits robust mechanical performance. This high strength is attributed to its martensitic structure and the addition of alloying elements. The combination of exceptional strength and good ductility allows MIM-4065 parts to withstand heavy loads and dynamic stresses without succumbing to deformation or failure.

MIM-4065 low alloy steel finds utility in various applications where strength is a critical requirement. Industries such as automotive, aerospace, and industrial machinery benefit from its high tensile and yield strengths. Components subjected to substantial loads, such as structural parts, fasteners, and gears, rely on MIM-4065's strength to ensure optimal performance under demanding conditions. Moreover, surgical instruments and medical implants, where strength and biocompatibility are essential, also benefit from MIM-4065's mechanical properties.



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