

# Titanium Grade 5 (3.7164)

## Material Ti6Al4V

The material Ti6Al4V is a frequently used titanium alloy, also known as 3.7164 in accordance with the AMS standard. This alloy was specially developed for use in the aerospace industry. The standards AMS 4928, which relates to forged material, bars, profiles and wires, and AMS 4911, which relates to strips and sheets, ensure that the titanium alloy 3.7164 meets the strict quality standards of the aerospace industry.

Another industrial variant of this titanium alloy is titanium grade 5, which is standardized according to ASTM B248 for flat material and ASTM B348 for round material and is classified as material number 3.7165. This alloy is also used in medical technology, particularly for surgical implants. The ASTM F136 standard specifies strict requirements for the chemical composition and mechanical properties. As a result, Ti6Al4V is labeled with the suffix “ELI” (Extra Low Interstitial) for even lower interstitial contents and is designated as grade 23 instead of grade 5. Notable properties of Ti6Al4V include good hot formability and weldability, excellent resistance to various corrosive media, high strength and toughness at low density, excellent fatigue strength even under humid conditions and very high resistance to crack initiation and propagation.

### Chemical analysis of Ti Gr 5

Al %	V %	Fe % max.	C % max.	N % max.	O % max.	H % max.
5,50 – 6,75	3,50 – 4,50	0,40	0,08	0,05	0,20	0,015

### Mechanical properties at room temperature

**Tensile strength      Yield strength      Elongation**

MPa (N/mm <sup>2</sup> )	MPa (N/mm <sup>2</sup> )	%
892 min.	828 min.	10 min.

**Modulus of elasticity (reference value) (GPa):** 110 at room temperature

**Constriction (%):** Min. 25

### Heat treatment and welding of material 3.7164

Titanium grade 5 is soft annealed at 650 to 750 °C and stress-relieved at 450 to 600 °C for approx. 8 hours. The heat treatment requires a protective gas atmosphere or a vacuum atmosphere due to the high affinity of titanium to absorb oxygen and thus become brittle.

# Titanium Grade 5 (3.7165)

The material 3.7165 is also known as titanium grade 5 or Ti6Al4V and is used very frequently in industry. The alloy has high strength, lightness and excellent corrosion resistance. It is preferred in the aerospace, automotive and medical technology industries..

## Main characteristics of Ti6Al4V (3.7165):

- High tensile strength and ductility
- Good corrosion resistance
- Excellent biocompatibility
- High resistance to fatigue fracture

## Chemical analysis of Ti Gr 5 (3.7165)

The alloy consists mainly of titanium and is alloyed with aluminum and vanadium to improve strength and heat resistance.

Al %	V %	Fe % max.	C % max.	N % max.	O % max.	H % max.
5,50 – 6,75	3,50 – 4,50	0,40	0,08	0,05	0,20	0,015

## Mechanical properties at room temperature

The mechanical properties of titanium grade 5 (3.7165) are impressive and make it a preferred material for demanding applications.

**Tensile strength:** min. 895 MPa (N/mm<sup>2</sup>)

**Yield strength:** 828 MPa (N/mm<sup>2</sup>)

**Elongation:** min. 10 %

**Modulus of elasticity (guide value) (GPa):** approx. 110 at room temperature

**Constriction:** min. 25 %

## Heat treatment and processing of material 3.7165

Titanium Grade 5 can be customized by various heat treatment processes to obtain specific properties. Typical processes: Solution annealing and age hardening. It is important to exercise caution when heat treating titanium alloys to avoid oxidation and scaling. Titanium Grade 5 is also readily weldable, although special procedures must be used to preserve the integrity of the alloy.

Please note that exact specifications and values may vary depending on the manufacturer and specific batch. We recommend contacting the material manufacturer or a qualified engineer directly for the most accurate and up-to-date information.