NUANCE TI CP GRADE 4 ASTM F67 ISO 5832-2 ASTM B348

STAINLESS

High performance Alloys - Medical - Aerospace - Microtechnics - Motorsport - Industry

GENERALITIES

Titanium grade 4 (T60) *has low density, very good biocompatibility and corrosion resistance. The grade can be easily shaped, for example by stamping.*

Stainless has a number of qualified sources in stock as well as different sizes and formats to suit your processing needs. This product can also be made to measure or cut into pieces by our service centres.

Each material is delivered with its producer's certificate of origin in order to guarantee you total transparency and complete traceability.

APPLICATIONS

The grade can be used wherever corrosion resistance is required, whether in the chemical industry, marine environments or medical implants. The material is available in the annealed condition for all sizes. The grade is susceptible to galling and is not recommended for applications with friction under load.

STANDARDS AND DESIGNATIONS

Numerical designations:
W. Nr 3.7035 - UNS R50400 – AFNOR : T60

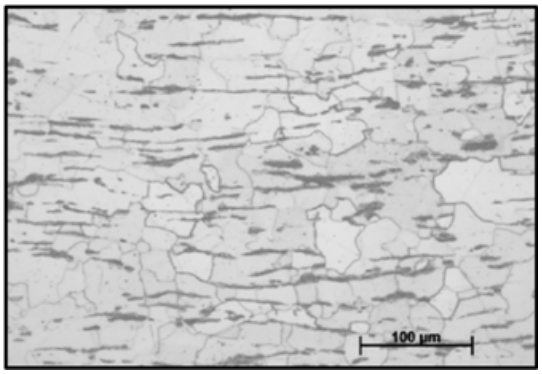
Standards :
ASTM F 67 – ASTM B348 (Grade 4) – ISO 5832-2 ASTM B265 (Grade 4)

TYPICAL CHEMICAL ANALYSIS (mass %)

	Carbon	Iron	Oxygen	Hydrogen	Nitrogen	Other elements : every	Other elements : Total	Titanium
MIN	---	---	---	---	---	---	---	BALANCE
MAX	0.08	0.50	0.4	0.015	0.05	0.1	0.4	

METALLURGY

The production processes combined with the transformation processes make it possible to obtain a homogeneous alpha microstructure with a grain. The typical microstructure is shown opposite:



NUANCE TI CP
GRADE 4
ASTM F67
ISO 5832-2
ASTM B348

PHYSICAL PROPERTIES AT 20°C

Density.....4.5 g.cm-3
Coefficient of thermal expansion (between 20 et 200°C).....8.6 x 10^{-6} m/m.°C
Young's modulus......105 x 10^{3} MPa
Thermal conductivity.....22 W.m K^{-1}
Relative magnetic permeability..... ≤ 1.01

MECHANICAL PROPERTIES OF THE BARS

The grade is offered as standard in the annealed condition around 600-700°C with the following properties:

Delivery	UTS (Mpa)	YS 0.2% (Mpa)	E%	Z%
Annealing bars	> 550	483	> 15	> 25
Annealing sheets	> 550	483 - 655	> 15	---

The products can be stress relieved to limit the presence of residual stresses. A cold worked grade 4 version is also available on bars with higher mechanical properties (approximately 100 MPa higher).

PROCESSIES

Forgeability/Usability
The grade can be hot forged below Beta transus (<900°C). Machining of this grade requires sufficient watering to limit heating and avoid chlorinated lubricants which weaken the grade. The grade is weldable with pure titanium wires in an inert atmosphere.

Weldability
The grade can be welded with pure titanium filler wire under an inert atmosphere. TIG, plasma or laser welding is possible.

Heat treatments
Annealing can be carried out from 600°C after forging. However, this treatment must remain under control so as not to degrade the quality of the microstructure. After annealing, the oxidised surface is removed mechanically or chemically to remove the contamination layer (alpha case).

CORROSION RESISTANCE

The grade is highly resistant to general corrosion and also to pitting. Chlorinated solvents should be avoided. Titanium is also susceptible to hydrogen embrittlement, so it is important to limit any hydrogen input during heat treatment or chemical pickling processes.

STANDARD SHAPE

- 3m round bars annealed - Surface ground or peeled
- Flat bars made to measure or forged blocks in the annealed state (consult us)
- Powders - Sheets - Wires - Tubes - Strips

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