



# STAINLESS

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

1.4441

UNS S31673

ASTM F138

ASTM F139

ISO 5832-1

## GENERALITIES

The **1.4441 grade** is remelted using an ESR consumable electrode, which increases its cleanliness and homogeneity. These advantages are essential to ensure high fatigue life, biocompatibility and very good corrosion resistance.

Stainless has a number of qualified sources in stock as well as different formats or product states to best suit your processing needs. This product can also be custom made or cut into slabs 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

Due to its biocompatibility and non-magnetic behaviour, which is recognised in the medical field, the grade is mainly used in the manufacture of implants, which are usually obtained by machining. The material is available in the annealed, semi-hard or extra-hard state for the smallest sections.

## STANDARDS AND DESIGNATIONS

### Numerical designations:

W. Nr 1.4441 - UNS S31673 - 316LVM

### Standards :

ISO 5832-1 - ASTM F 138 - ASTM F139 X2CrNiMo18-15-3 - AFNOR Z2CND18-14-3 BS 7252

### Brands:

UGIPURE®4441, M25W®,...

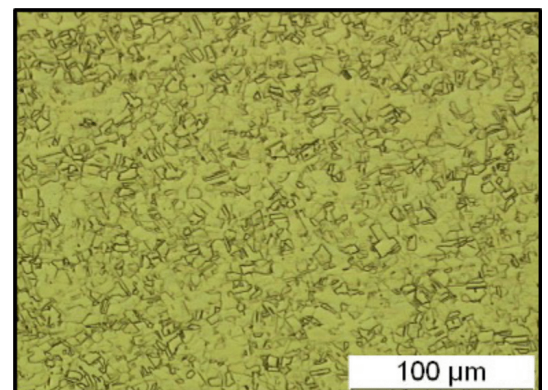
## TYPICAL CHEMICAL ANALYSIS (mass %)

	Carbon	Manganese	Phosphorus	Sulfur	Silicium	Chrome	Nickel	Molybdenum	Nitrogen	Copper	Cobalt	Iron
MIN	---	---	---	---	---	17.0	13.0	2.25	---	---	---	BALANCE
MAX	0.03	2.0	0.025	0.010	0.75	19.0	15.0	3.0	0.10	0.50	0.10	

## METALLURGY

The production processes combined with the transformation processes allow a homogeneous microstructure with a fine grain of at least index 5 to be obtained. See micrograph below in the annealed condition:

The microstructure consists of austenitic grains and does not show any delta ferrite or Chi phase under standard observation conditions (X 100). Its cleanliness is controlled with the following limits according to ASTM E45: Type A, B, C and D thin  $\leq 1.5$  and Type A, B, C and D thick  $\leq 1$ .



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PHYSICAL PROPERTIES AT 20°C

- Density.....8 g.cm-3
- Coefficient of thermal expansion (between 20 et 200°C).....16 x 10<sup>-6</sup> m/m.°C
- Young's modulus.....200 x 10<sup>3</sup> MPa
- Thermal conductivity.....15 W.m /m<sup>2</sup> .°C
- Relative magnetic permeability.....≤ 1.01

MECHANICAL PROPERTIES OF THE BARS

The grade can be offered in the annealed or hardened condition with the following properties:

Temper	Shape	UTS (Mpa)	YS 0.2% (MPa)	E5d%
Annealing	Bar or sheet metal	490-690	> 190	>40
Hardened Medium-hard	Bar or sheet metal	860-1100	> 690	>12
Hardened Extra hard	Bar	>1400	---	---

PROCESSION

Forgeability

The grade can be hot forged in the temperature range 900/1150°C. Annealing should be carried out after forging to restore the microstructure (dissolution of carbides)

Polishability

The high level of inclusion cleanliness and the homogeneity of the microstructure of this grade allows for optimum polishing.

Typical heat treatments

Annealing at 1050-1120°C followed by rapid quenching may be carried out after forging to restore, in particular corrosion resistance, but no heat treatment can harden the grade.

CORROSION RESISTANCE

The grade is highly resistant to generalized and pitting corrosion due to its high molybdenum content combined with its low inclusion with its low inclusion rate.

STANDARD SHAPE

- Round bars annealed, medium-hard or extra-hard depending on the diameter - Hardened or ground surface
- Flat bars made to measure in the annealed condition (consult us)
- Other formats: please contact us

The information, data and photos presented in this document are given in good faith and for information purposes only. If you need more precise data, our technical department is at your disposal. Click on the link : t.turpin@stainless.eu

