1.4404
UNS S31603
ASTM F899
NF S 94090
NF EN 10088

STAINLESS

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

GENERALITY

Grade 1.4404 or 316L is an austenitic stainless steel type AISI 316 which has very good corrosion resistance due to its high chromium and molybdenum content combined with a low carbon content. Its strength in the hardened condition is around 600 MPa for large diameters but can be increased by cold working for small sections.

Stainless has a number of qualified sources in stock as well as different sizes or conditions of the product to suit your processing requirements. This product can also be made to order or cut into slugs by our service centres.

APPLICATIONS

Among the many applications are products in the products in the mechanical, chemical, oil chemical, petroleum, watchmaking, food and beverage or even the medical sector for the instrumentation.
The material is available in a hyper-hardened state (annealed) for large diameters or hardened for small for small sections.

STANDARDS AND DESIGNATIONS

Numérical designation:
W. Nr 1.4404 – 1.4401 (316) - UNS S31603 – 316L

Standards:
ISO7153-1, ASTM F899, NF S94-090, NF EN 10088-3 et -2, ASTM A479, ASTM A276 X2CrNiMo17-12-2 – AFNOR Z3CND17-11-2 BS 316S31

Brand: UGI®4404, ...

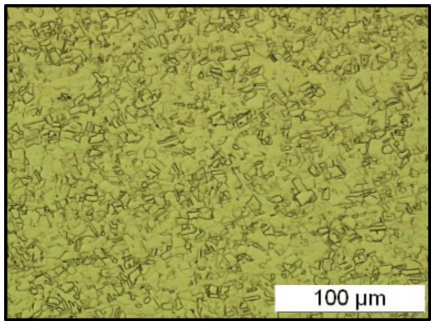
TYPICAL CHEMICAL ANALYSIS (mass %)

	Carbone	Manganese	Phosphorus	Sulphur	Silicium	Chrome	Nickel	Molydene	Nitrogen	Cobalt	Iron
MIN	---	---	---	---	---	16.5	10.50	2.0	---	---	BAL
MAX	0.03	2.0	0.045	0.015	1.0	18.0	13.0	2.5	0.11	0.10	

The chemistry of 316L differs from 316 only in that the maximum carbon content is 0.03% instead of 0.07%.

METALLURGY

Die Nuance wird in der Regel mit Luft (EAF) entwickelt, gefolgt von einem AOD zur Entkohlung durchlaufen. Die Mikrostruktur ist besteht aus austenitischen Körnern mit einer Lösungsglühung der Karbide mit dem Ziel, der intergranularen Korrosion zu widerstehen. (siehe typisches Schliffbild unten im geglühten Zustand) :



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PHYSICAL PROPERTIES AT 20°C

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

MECHANICAL PROPERTIES OF BARS

The grade can be offered in the annealed state with the following properties:

Temper	Shape	UTS (MPa)	YS 0.2% (MPa)	E5d%
Annealing	**Bars**	**460-690**	**> 190**	**> 40**

À l'état écroui sur les petits diamètres uniquement, la valeur de Rm peut dépasser 1400MPa.

PROCESSIES

Forgeability
The grade can be hot forged in the temperature range 1150/1200°C. Annealing should be carried out after forging to restore the microstructure (dissolution of carbides).

Weldability
MIG, TIG or other welding techniques can be used. The filler metal will be type 316L.

Typical heat treatments
Annealing at 1050 to 1080°C followed by rapid quenching may be carried out after forging to restore corrosion resistance, but no heat treatment is required to harden the grade.

CORROSION RESISTANCE

The grade is highly resistant to generalized and pitting corrosion due to its high molybdenum content combined with low carbon content. with its low carbon content. The lower carbon content puts it above a conventional 316 steel.

STANDARD SHAPE

- Round/flat bars annealed or cold worked depending on diameter - Hardened or ground surface
- Hardened or annealed plates - Powdered
- Other formats: consult us

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