

STAINLESS GROUP High performance Alloys - Medical - Aerospace - Microtechnics - Motorsport - Industry **1.4545** 15-5PH XM12 UNS S15500

i GENERALITIES

Alloy 1.4545 or 15-5PH is a structurally hardened martensitic stainless steel that combines a hardness of around 43 HRC, good toughness (higher than alloy 1.4548) and very good corrosion resistance. This grade has a hardening peak at 480°C, making it easy to carry out ageing after machining on a condition initially in solution (condition A). The grade is also available in a pre-treated condition. This aerospacegrade alloy is produced by VAR (Type 1) or ESR (Type 2) remelting to limit sulphur and phosphorus content and optimise the microstructure.

STAINLESS has several sources in stock, as well as different product formats and conditions to meet your processing requirements. This product can also be made to measure or cut into billets by our service centres.

Thanks to its good corrosion resistance, good hardness in the treated condition (43HRC) and resilience, the grade is used in particular in the manufacture of aeronautical components (structural elements, fasteners, etc.) and in applications in the defence and energy sectors.

STANDARDS AND DESIGNATIONS

Numerical designations:

W. Nr 1.4545 - XM12 - UNS S15500

Standards :

AMS 5659 (redesigned VAR Type 1 or ESR Type 2) – ASTM A564 – LAT 1-9037

Designation : X5CrNiCu15-5

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Brands:

UGI®4545PURE, UGIPURE®15-5PH, X15U5W®

Contact our Technical Support

TYPICAL CHEMICAL ANALYSIS (mass %)

	Carbon	Manganese	Phosphorus	Sulfur	Silicium	Chrom	Nickel	Copper	Niobium + Tantalum	Molybdenum	lron
min						14.0	3.50	2.50	5 X %C		Balance
max	0.07	1.0	0.030	0.015	1.0	15.50	5.50	4.50	0.45	0.50	Dulutice

\mathbb{Q} metallurgy

The manufacturing process includes VAR (Type 1) or ESR (Type 2) remelting, which increases the cleanliness and homogeneity of the product. The hot transformation process produces a controlled microstructure and macrostructure. In the heat-treated state, the microstructure consists of martensite and nanometric intermetallic precipitates (Ni3Cu) that germinate during ageing. AMS 5659 also guarantees less than 2% ferrite, which improves cross-direction toughness compared with 17-4PH.



PH

Q PHYSICAL PROPERTIES AT 20°C	
Density	
Coefficient of thermal expansion (between 20 and 200°C)	10,8 x 10 ⁻⁶ m/m.°C
Young's modulus	197x 10 ³ MPa
Thermal conductivity	17W.m ⁻¹ .K ⁻¹

Thermal c Ferromagnetic grade that can be magnetized

MECHANICAL PROPERTIES OF THE BARS

In particular, the grade is offered in the annealed (cond A) or pre-treated condition with the following properties:

Tompor	Hardnocc	UTS (MPa) - Long	E4D%		(1) Charpy (ISO	
	naiuliess	and Transverse	Long	Trans	V) - Joules	
Quenched or Annealed (cond A) WL 1.4545.9	< 363 HBW < 39 HRC	< 1207				
Pre-traited H900 (482°C/1h)	> 40 HRC	> 1310	> 10	> 6	20	
Pre-traited H1025 (552°C/4h) – P1070 WL 1.4545.4	> 34 HRC	> 1069	> 12	> 8	48	
Pre-traited H1075 (579°C/4h) -	> 31 HRC	> 1000	> 13	> 9	54	
Pre-traited H1150 (621°C/4h) – P930	> 28 HRC	> 931	> 16	> 11	68	

(1) Non-contractual typical values

PROCESSES

Forgeability

The grade can be hot forged in the 1010/1180°C temperature range. Resolving will be necessary to achieve maximum hardness.

Weldability

The grade can be welded using most processes. Welding should preferably be carried out before ageing to avoid embrittling the heat-affected zone.

Typical heat treatments

For a target hardness ≥ 40 HRC

- Heating 1030/1050°C - Oil quench (water and air) - Ageing H900 (482°C)

A volume shrinkage of up to around 0.07% is to be expected during ageing.

Our subsidiaries

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🛈 CORROSION RESISTANCE

The grade is highly resistant to corrosion and is one of the best martensitic stainless steels. The microstructure contains little or no chromium carbides, making it highly insensitive to intergranular corrosion.

STANDARD SHAPE

Round bars or forged blocks annealed (Condition A) or pre-treated (H1025) - Surface hardened or ground depending on diameter Other formats: contact us

The information, data and photos presented in this document are given in good faith and for guidance only. If you need more precise information, our technical department is at your disposal.



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