15-5PH

15-5PH is a chromium-nickel-copper precipitation hardening stainless steel used for applications requiring high strength and a moderate level of corrosion resistance. High strength is maintained to approx. 316℃.

15-5PH is a martensitic in structure in the annealed condition and is further strengthened by a low temperature treatment which precipitates a copper containing phase in the alloy. In comparison to many alloys in the precipitation hardening family, 15-5PH requires a simple hardening treatment in the temperature range 482℃ to 621℃ depending on the combination of strength and toughness desired.

15-5PH was designed to have greater toughness than 17-4PH, especially in the through-thickness (short transverse) direction. The improved toughness is achieved by reduced delta ferrite content and control of inclusion size and shape.

Chemical Composition, %

element	Cr	Ni	Fe	Cu	Nb+Ta	C	Mn	Si	P	S
min.	14.00	3.50	bal.	2.50	0.15					
max.	15.50	5.50		4.50	0.45	0.070	1.00	1.00	0.040	0.030

Chemical Composition according to ASTM. Some compositional limits of other specifications may vary slightly.

Designation and standards

National Standards	Material designation	Chemical composition	Forgings	Rod and bar	Plate and sheet	Strip
ASTM ASME SAE NACE	UNS S15500 XM-12	A959 SA959 MR0175	A705 SA705 AMS5659	A564 SA564 AMS5659	A693 SA693 AMS5862	A693 SA693 AMS5862
GB/T	05Cr15Ni5Cu4Nb S51550	GB/T 20878		GB/T 1220		

Density 7.81g/cm^3

Corrosion resistance

- corrosion resistance comparable to stainless type 304 in most media
- good resistance to stress-corrosion cracking, gained by hardening at high temperatures
- acceptable resistance to sulfide stress cracking at Rockwell C33 maximum hardness per NACE MR0175.

Applications

Typical applications are:

- Marine gas turbine compressor sections
- Hallow shafts
- Paper mill equipment
- Aircraft components
- nuclear reactor components

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