ALLOY 1.4923

1.4923 High temperature resistant stainless steel with molybdenum addition.

Standards:

DIN: X 22 Cr Mo V 12-1

DIN 1.7240: 1.4923

Chemical properties:(weight%)

C	Cr	Ni	Mo	V	Fe
0.18-0.24	11-12.50	0.30-0.80	0.8-1.20	Max.0.30	balanced

General properties

corrosion resistance : average

mechanical properties : good

forgeability : good

weldability : good

machinability : average

Special properties

resistant to scaling up to around 600 °C

maximum hardness approximately 590 Hv

Physical properties

density (kg/dm3) : 7,7

electrical resistivity (Ωmm2 /m) : 0,60

thermal conductivity (W/m K) : 24

specific heat capacity (J/kg K) : 460

thermal expansion (µm/mK) between 20 and 100°C : 10,5

Typical applications:

pressure vessels and boilers aviation and aerospace reactor manufacture turbine components.

Processing

automated machining : not common

machinable : yes

hammer and die forging : yes

cold forming : limited

cold heading : limited

Demand tendency

1.4923, is the standard material of construction for components such as steam turbines and heat resistant screws etc. The vanadium addition serves to improve the creep and high temperature strength properties of this steel.

corrosion resistance

(PRE = 13,64 to 16,46) Due to its relatively low chromium content, the corrosion resistance of 1.4923, is somewhat limited, but sufficient to resist corrosion in rural and urban atmospheres, provided no chlorides or salts are present. 1.4923 is resistant to steam.

Heat treatment / mechanical properties

Optimal mechanical properties may be attained by quenching and tempering, in which the steel is first hardened by holding the steel at a temperature between 1020 and 1070°C followed by quenching in air, oil or polymer. The tempering temperature is dependent on the desired strength. In most cases a tempering treatment in the temperature range 640 to 740°C followed by air cooling produces the required properties. In this condition, the following mechanical properties can be expected:

QT800

Yield strength: ≥600 Mpa

Tensile strength: 800-900 Mpa

Elongation: ≥%14

Impact energy ISO-V : ≥52 J

QT900

Yield strength: ≥700 Mpa

Tensile strength: 900-1050 Mpa

Elongation: ≥%11

Welding:

1.4923, may only be welded once special precautions have been taken. For example, the work piece must be pre-heated to a temperature between 400 and 450°C, depending on the geometry of the component. During welding, an interpass temperature of between 400 and 500°C must be maintained. After welding, the component can be immediately annealed or tempered. If a tempering treatment is performed, then the weldment must be slowly cooled to a temperature between 100 and 150°C. After complete transformation to martensite, the component must be tempered at a temperature between 740 and 780°C for a period of at least 4 hours. Tempering is to be followed by slow cooling.

Forging:

Gradual heating to a temperature of about 850°C is recommended prior to more rapid heating to a temperature of between 1150 and 1180°C. Forging then takes place between 950 - 1180°C followed by slow cooling is an oven or in dry ash or similar material to promote slow cooling. After forging, the forged components are heat treated to attain the required properties.

Machining :

The machinability of this heat resistant stainless steel is directly related to its hardness and is generally considered to machine similarly to carbon steels of the same hardness. Although it must be realised that the machining parameters will vary depending on the structure or hardness of the steel, the following parameters can be used as a guideline when using coated hardmetal cutting tools: