Stainless steel 2507 Alloy

The **Stainless steel 2507 alloy** is made of 25% Cr, 4% Mo and 7% Ni that is made for the commercial applications that need high strength and corrosion resistance. The steel alloy offers outstanding resistance to chloride stress corrosion cracking, high thermal conductivity and nominal coefficient of thermal expansion. The high concentration of chromium, molybdenum and nitrogen provides advanced resistance to pitting, crevice and natural corrosion.

Chemical composition of Stainless steel 2507 Alloy

C	Cr	Ni	Mo	N	Others
0.020	25	7	4.0	0.27	0.001
Remaining ≥ 40 %					

The combination of large tensile strength and impact strength with lower coefficient of thermal expansion and large thermal conductivity makes this alloy superior for many applications. The high strength **stainless steel 2507 alloy** is suitable for using in the structural and mechanical sections. Minor, ambient and high temperature mechanical features of **stainless steel 2507 alloy** are provided below. This stainless steel grade is not recommended for using in the operations that need prolonged exposure of material in the high temperatures more than 570oF due to increase in the hardness.

Mechanical properties of Duplex stainless steel 2507

Ultimate Tensile Strength, ksi	116 min
0.2% Offset Yield Strength 0.2%, ksi	80 min
0.1% Offset Yield Strength 0.2%, ksi	91 min
Elongation in 2 inches, %	15 min.
Hardness Rockwell C	32 max.
Impact Energy, ft.-lbs.	74 min

Impact properties of stainless steel at the low temperatures

oF	RT	34	-4	-40
Ft.-lbs.	162	162	155	140
oF	-76	-112	-148	-320
Ft.-lbs.	110	44	30	7

Tensile Properties of stainless steel 2507 alloy

oF	68	212	302	392	482
0.2% Offset Yield Strength, ksi	80	65	61	58	55
Ultimate Tensile Strength, ksi	116	101	98	95	94

Physical properties of stainless steel 2507 alloy

Density	lb/in^3	0.28
Modulus of Elasticity	psi x 10^6	29
Coefficient of Thermal Expansion 68-212°F/°F	x10^{-6}/°F	7.2
Thermal Conductivity	Btu/lb/°F	8.7
Heat Capacity	Btu/lb/°F	0.12
Electrical Resistivity	-in x 10^{-6}	31.5

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The **Stainless steel 2507 alloy** offers high impact strength and is utilized for different applications that are broadly conducted at the temperatures over 570oF due to loss of hardness.

Corrosion Resistance

The concentrated chromium and molybdenum in **stainless steel 2507 alloy** provide superior resistance to corrosion by organic acids such as formic acid, acetic acid and inorganic acids primarily chlorides. In the dilute sulfuric acid consisting of chlorides, 2507 alloy offers higher resistance to corrosion as compare to 904L alloy. The steel 904L has better alloyed austenitic steel configuration that offers wide resistance to sulfuric acid.

Behavior in Acids

The stainless steel 316L is not suggested for employing in hydrochloric acid conditions due to resistance to local and uniform corrosion. The 2507 alloy can be utilized in the presence of hydrochloric acid. The pitting corrosion may not be a risk in this section though crevice should be inhibited. The lower concentration of carbon in 2507 decreases the risk of carbide precipitation at the grain boundaries while heat processing, so it offers wider resistance to the intergranular corrosion.

The **Duplex stainless steel 2507 alloy** offers superior resistance to chloride stress corrosion cracking. Due to high concentration, 2507 alloy offers extensive resistance to corrosion and has high strength. It is widely purposeful in offshore oil and gas operations and wells with large brine levels or that need brine injected to increase recovery. Different analysis methods are followed to obtain the pitting resistance of steels in the chloride solutions.

The critical pitting temperatures of different high performance steels in 1M sodium chloride solution is evaluated. The results describe the outstanding resistance offered by **Stainless steel 2507 alloy** to the pitting corrosion. The presence of crevice cannot be inhibited in the practical manufacturing processes and operations that make the material more prone to the corrosion in the chloride conditions. The stainless steel 2507 offers excellent resistance to crevice corrosion.

Hot Processing

The stainless steel 2507 is not preferred for hot processing at temperatures between 1875oF to 2250oF. The hot working should be done subsequent to solution annealing at 1925oF and rapid air quenching or water quenching.

The traditional stainless steel forging methods can be followed for cold processing of 2507 alloy. It possesses great yield strength and nominal ductility over austenitic steels therefore the manufacturers should evaluate the higher forging forces, large bending radius and allowance for springback are important. The vast drawing, stretch forging and similar methods are tough to implement on stainless **steel 2507 alloy** rather than austenitic steel. When forming needs more than 10% cold bending, solution annealing and cooling are suggested.

Cold Processing

The **Stainless steel 2507 alloy** should be solution annealed and cooled by following the hot and cold processing. The solution annealing is done at least temperature 1925oF. Subsequent to annealing the air quenching is done quickly or water cooling. To obtain the significant resistance to corrosion, heat processed products need to be pickled and rinsed.

Welding of Stainless steel 2507 Alloy

The 2507 alloy consists of superior weldability and can be connected to itself or other materials by shielded metal arc welding, gas tungsten arc welding, plasma arc welding, flux cored wire, or submerged arc welding while welding of 2507 as it forms the duplex weld configuration.

Stainless steel 2507 Alloy

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The preheating of 2507 alloy is not essential to prevent condensation on cold metal. The interpass welding temperature should not be over 300oF or weld veracity can be broadly influenced. The root should be protected with argon sealing or nitrogen/hydrogen gas for highest resistance to corrosion.

Applications of Stainless Steel 2507

1. Oil and gas industry devices
2. Offshore platforms and heat exchanging device
3. Methods and operation water equipments and weight equipments
4. Chemical processing, containers and pipes
5. Desalination operations and seawater pipes
6. Mechanical and structural parts
7. Power industry, industrial scrubber systems

Stainless Steel 2507 Product Forms Available:

Wire, Wiremesh Screen, Strip, Sheet, Pipe, Tubing, Plate, Ribbon, Tape

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