

Duplex UNS 32304

Duplex Stainless Steel

TYPICAL AMERICAN DENOMINATION UNS 32304/ Type 2304

Chemical Composition

Element	C	Mn	Si	Cr	Ni	P	S	Cu	Mo	N
%	0,03	2,00	1,00	22,0 24,0	3,5 5,5	0,035	0,015	0,10 0,60	0,1 0,6	0,05 0,20

Values according to ASTM A240/A240M standard

General Characteristics

The duplex stainless steel combines high mechanical resistance and corrosion resistance. Result of a perfect union between austenitic stainless steels and ferritic stainless steels, this grade combines the best characteristics of both alloys, such as immunity to stress corrosion cracking and good weldability. The addition of nitrogen to duplex stainless steels increases tenacity and corrosion resistance of the HAZ (Heat-Affected Zone) compared to the base metal in welded condition.

With low percentage of nickel in its chemical composition, these steels present yield strength much higher than the austenitic stainless steels, which enables the design of projects with smaller thickness and greater corrosion resistance. The duplex (UNS S32304/ DIN 1.4362), also known as "lean duplex", is an attractive option for application in storage tanks, flexible tubes, road equipment, tanks for ships and equipment for the chemical segment, and pulp and paper segment.

Delivery Conditions*

- Products: coils, sheets, blanks and strips cold rolled and hot rolled

Thickness range (mm)	Mill edge width (mm)	Slitted edge width (mm)
1,20 to 10,00	1040, 1240, 1270, 1320	1000, 1020, 1200, 1219, 1220, 1250, 1300
12,70 to 50,80	1040, 1240, 1270, 1320, 1540	1000, 1020, 1200, 1219, 1220, 1250, 1300, 1500, 1524

* For further information please contact Aperam South America

Mechanical Properties

In annealed condition, according to standard ASTM E-8 M: samples are perpendicular to rolling direction, specimen with Lo = 80 mm. Typical values.

Yield Strength 0.2% (MPa)	Tensile Strength (MPa)	Elongation (%)	Hardness HRB
550	730	30	87

Physical Properties

Density	7.8 g/cm ³
Modulus of Elasticity	200 GPa
Average Coefficient of Thermal Expansion from 0°C to 100°C	13.0 µm/m.°C
from 0°C to 538°C	14.0 µm/m.°C
Thermal Conductivity at 100°C	17 W/m.K
Specific Heat	450 J/kg.K
Electrical Resistivity	0,8 µΩm
Melting Point	1465°C

Source: ASM Specialty Handbook – Stainless Steels

Corrosion Resistance

Due to its high content of chromium, the duplex UNS 32304 presents good general resistance to corrosion. As for pitting corrosion, it presents better behavior than AISI 316/316L, as it can be seen in the comparative graph presented below, represented by its PREN (*Pitting Resistance Equivalent Number*), which can be calculated by the formula: $PREN = \%Cr + 3.3x\%Mo + 16x\%N$.



In addition to pitting corrosion, it is important to highlight the duplex UNS 32034 stress corrosion cracking resistance. Studies show that it stands out among the austenitic stainless steels 304L and 316L in media containing chloride, due to the high chromium content and low nickel content.

The information contained in this publication has been obtained from laboratory test results and traditional and respectable bibliographic references. The behavior of stainless steel may change due to conditions of temperature, pH, contaminants, and also the conservation of tools used in welding and conformation. For these reasons, the information contained in this publication may be used only as initial reference for tests or final specification by the customer. Aperam South America is not responsible for any loss or damage caused by inappropriate use of the information contained in this publication.

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