Alloy 2304 Technical Specification

1.Product Description

Alloy 2304, also known as **UNS S32304**, is a lean duplex stainless steel known for its excellent corrosion resistance, high strength, and good weldability. It is primarily composed of iron, chromium, nickel, and molybdenum, offering a balance of the properties of both austenitic and ferritic steels. Alloy 2304 is a duplex stainless steel that combines the corrosion resistance of austenitic stainless steels with the strength of ferritic alloys. It offers high resistance to chloride-induced stress corrosion cracking (SCC), pitting, and crevice corrosion, making it ideal for use in environments where such issues are a concern, such as marine, chemical processing, and wastewater treatment industries.

.2. Chemical Composition:-

Element	Composition (%)
Chromium (Cr)	22.0–23.5
Nickel (Ni)	4.5–6.0
Molybdenum (Mo)	0.3–1.0
Iron (Fe)	Balance
Manganese (Mn)	1.0 max
Silicon (Si)	0.8 max
Carbon (C)	0.03 max
Phosphorus (P)	0.04 max
Sulfur (S)	0.02 max

3. Mechanical Properties:-

Property	Value
Yield Strength (0.2% offset)	60,000–80,000 psi (415–550 MPa)
Ultimate Tensile Strength	85,000–110,000 psi (585–760 MPa)

Elongation (in 8")	25% min
Hardness (Rockwell B)	90 max
Modulus of Elasticity	20,000 ksi (138 GPa)

4. Physical Properties:-

Property	Value
Density	7.8 g/cm³
Melting Point	1400°C to 1450°C (2552°F to 2642°F)
Electrical Resistivity	0.0009 ohm-cm
Thermal Conductivity	15 W/m·K
Specific Heat	0.12 cal/g°C

- ## 5. Heat Treatment **Solution Annealing**: Typically performed at **1020°C to 1100°C** (1868°F to 2012°F), followed by rapid cooling. This process enhances the alloy's corrosion resistance and mechanical properties.
- **Post-Weld Heat Treatment**: Not required for most applications due to the alloy's good weldability and resistance to sensitization.
-

.

6. Applications:-

- **Chemical Processing**: Equipment such as heat exchangers, tanks, and piping systems in industries handling acidic or chloride-rich chemicals.

- **Marine Applications**: Used in seawater systems, desalination plants, and offshore oil platforms due to its resistance to chloride-induced corrosion.
- **Pulp and Paper Industry**: Suitable for equipment exposed to aggressive chemical environments during the pulp and paper manufacturing process.
- **Wastewater Treatment**: Corrosion-resistant components in wastewater treatment plants, including pipes, tanks, and pumps.
    - **Food and Beverage**: Storage tanks, processing equipment, and other components exposed to food-grade chemicals.

7. Corrosion Resistance:-

-

- **Chloride-Induced Stress Corrosion**: Excellent resistance to chloride-induced stress corrosion cracking, especially in seawater and marine environments.

- **Pitting and Crevice Corrosion**: High resistance to pitting and crevice corrosion, even in environments with high chloride concentrations.
- **General Corrosion**: Good resistance to general corrosion in acidic environments such as sulfuric acid.
- **Oxidizing Acids**: Fair resistance to oxidizing acids, although it may not be as resistant as higher-alloyed duplex or super-austenitic steels.