Inconel 625

Inconel 625 with low carbon (C≤0.03%) shows excellent resistance to a variety of corrosive media. The alloy is supplied in the soft-annealed condition for applications involving wet corrosion conditions at service temperatures up to 593℃ (Inconel 625, grade 1) and for pressure vessels in the temperature range -196 to 450℃. Due to its low carbon content and stabilizing heat treatment, the alloy shows little tendency to sensitization even after 50 hours at temperatures in the range 650~900℃.

Inconel 625, grade 1, is characterized by:

- outstanding resistance to pitting, crevice corrosion, erosion and intergranular attack
- almost complete freedom from chloride-induced stress-corrosion cracking
- good resistance to mineral acids, such as nitric, phosphoric, sulfuric and hydrochloric acids
- good resistance to alkalis and organic acids
- good mechanical properties

For high-temperature applications, above approx. 600℃, where high strength and resistance to creep and rupture are required, a solution-annealed version (Inconel 625, grade 2) with preferably a slightly higher carbon content (0.03~0.10%) is occasionally employed and may be available.

The mechanical properties of Inconel 625 can be slightly increased by age-hardening.

Chemical Composition, %

element	Cr	Ni	Mo	Nb	Fe	Co	Al	Ti	C	Mn	Si	P	S
min.	20.0	58.0	8.0	3.15									
max.	23.0		10.0	4.15	5.0	1.0	0.4	0.4	0.10	0.5	0.5	0.015	0.015

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	Wire	Seamless tube
ASTM ASME SAE	UNS N06625		B564 SB564 AMS5666	B446 SB446 AMS5666	B443 SB443 AMS5599 AMS5869	B333 SB333 AMS5599 AMS5869	AMS5837	B444 SB444 AMS5581
DIN	2.4856 NiCr22Mo9Nb	DIN 17744 DIN 10095		DIN 17752	DIN 17750	DIN 17750	DIN 17753	DIN 17751
GB/T	NS3306, NS336 GH3625, GH625	GB/T 15007 GB/T 14992		GB/T 15008	GB/T 15009 GB/T 15010 GJB 3317A			GB/T 30059

Density 8.44g/cm^3

Corrosion resistance

- excellent resistance to pitting and crevice corrosion in chloride-bearing media
- essentially resistance to chloride-induced stress-corrosion cracking
- high resistance against impingement and erosion corrosion
- high resistance to corrosive attack by mineral acids, as well as to alkalis and organic acids in both oxidizing and reducing conditions
- practically no corrosive attack in marine and industrial atmospheres. High resistance to seawater and brackish water, even at higher temperatures
- high resistance against intergranular corrosion following thermal treatment and welding

Inconel 625 grade 2 (solution-annealed condition) shows good resistance to many corrosive gas atmospheres:

- good resistance to carburization and to oxidation under static and cyclic conditions; suitable for use in air up to 1000℃
- resistance to nitridation
- good resistance to halogen containing gases and to hydrogen chloride

Applications

Inconel 625 grade 1 (soft-annealed condition) is preferred for applications in the chemical process industry, in marine engineering and in pollution control equipment for environmental protection.

Typical applications are:

- superphosphoric acid production equipment
- nuclear waste reprocessing equipment
- sour gas production tubes
- piping systems and sheathing of risers in oil exploration
- flue gas scrubber and damper components
- chimney linings

Inconel 625 grade 2 (solution-annealed condition) can be used for high-temperature applications, up to approx. 1000℃.

Typical applications are:

- components in waste gas systems and waste gas cleaning plants exposed to higher temperatures
- flare stacks in refineries and offshore platforms
- recuperators and compensators
- submarine diesel engine exhaust systems
- superheater tubes in waste incineration plants
- cladding of waterwall sections and superheater tubes in waste incineration plants by overlay welding