2304 Duplex Steel Pipe & Tube – UNS S32304 / WNR 1.4362

Duplex 2304 is two-phase, ferritic, austenitic which contain chromium 23%,nickel 4%, molybdenum-free duplex stainless steel. Itscorrosion resistance properties are similar to 316L stainless steel. Furthemore it has mechanical properties twice to 304L stainless steel/316Lstainless steel grades. And this becomes helpful for the manufacturers to save weight especially for properly designed pressure vessel applications. It is particularly suitable for applications covering the -50 °C/+300 °C temperature range.

2304 Duplex Steel Properties

- It has good resistance to stress corrosion cracking.
- It provides has good resistance to pitting and crevice corrosion.
- It is high resistant to general corrosion.
- It has high mechanical strength.
- It is high resistant to erosion corrosion and corrosion fatigue.

2304 Duplex Steel Applications

- Pressure vessels
- Heat exchangers
- Desalination plants
- Storage tanks
- Water heaters
- Feedwater tubes
- Flue-gas cleaning
- Seawater systems
- Rotors, impellers and shafts
- Parts for structural design
- Piping and instrumentation tubing for general service
- Firewalls and blast walls on offshore platforms
- Cargo tanks and pipe systems in chemical tankers

2340 Duplex Steel Equivalent grades

DIN	EU EN	USA –	Commercial	France AFNOR
1.4362	X2CrNiN23-4	S32304	2304	Z3CN23-04Az

2340 Duplex Steel Chemical composition

Carbon	Silicon	Manganese	Nickel	Phosphorus	Sulphur	Chromium	Molybdenum	Nitrogen	Copper
0.03max	1.00max	2.0max	3.5 – 5.5	0.035max	0.015max	22 – 24	0.1 – 0.6	0.05 – 0.2	0.1 – 0.6

2340 Duplex Steel Mechanical Properties

Tensile Strength ksi (MPa)min	Yield Strength 0.2% offset ksi (MPa)min	Elongation (% in 50mm) min	Hardness (Brinell) max	Hardness (Rockwell B)max
87(600)	58(400)	25	293	31^j

2340 Duplex Steel Heat Treatment

It is to be solution annealed at 1020 – 1100°C followed by water quenching

2340 Duplex Steel CORROSION RESISTANCE

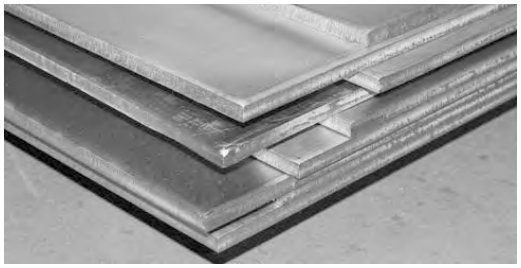
Due to its high chromium content of 23%, the corrosion resistance properties of it are practically equivalent to those of stainless steel 316L.Its duplex microstructure and low nickel and high chromium contents allows itto provide improved stress corrosion resistance properties compared to stainless steel 304L and 316L grades.It is more resistant to pitting and crevice corrosion resistance that stainless steel 316Lin stress corrosion cracking resistance in chloride containing aqueous solutions.Its corrosion rate in boiling nitric acid (65%) is higher than that of stainless steel 316L. It has high yield strength which allows it to perform well in abrasion/corrosion applications.

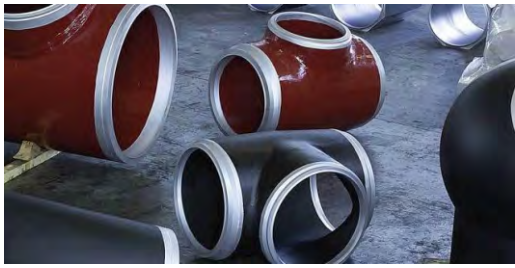
2340 Duplex Structure

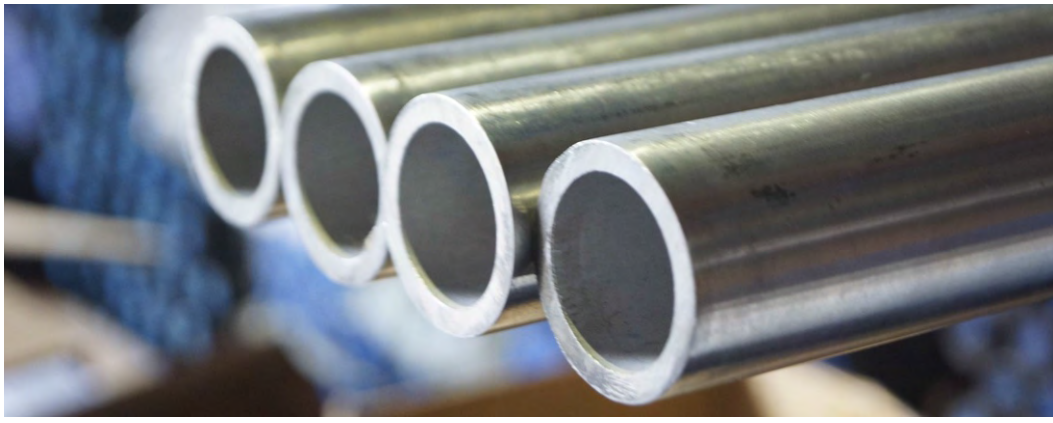
As compared to molybdenum containing duplex stainless steels the microstructure of Duplex 2304 is very stable. After annealing in a temperatureit contains approximately equal amounts of ferritic and austenitic in microstructure.

2340 Duplex Manufacturing Process

Its machining is performed at low speeds, and constant feeds which help to reduce its tendency to work harden. It is tougher than stainless steel 304 and 316 due to its long stringy chip. Chip breakers are recommended. Unlike the 300 series stainless steel it requires more pressure while performing forming due to its higher yield strength. It has low ductility characteristic which tends to make it difficult to perform forming operations.Welding can be performed using most of the conventional methods such as submerged arc welding (SAW),gas–tungsten arc welding (GTAW), and gas–metal arc welding (GMAW). Hot working can be done after heating the material to 954-1093°C, which is followed rapid cooling. Annealing after working is recommended. For annealing, it has to be heated at 930-1050°Cand then rapidly quenched.







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