

2205 vs 2507 Duplex Stainless Steel

What Is the Difference Between 2205 and 2507 Duplex Stainless Steel?

Duplex stainless steels are widely recognized for their exceptional combination of strength, corrosion resistance, and cost-effectiveness. Among the most commonly used grades are 2205 duplex stainless steel and 2507 super duplex stainless steel. Though similar in microstructure, these two materials have distinct chemical compositions, mechanical properties, and suitable applications.

Quick Comparison Table:

2205 Duplex Stainless Steel vs 2507 Super Duplex Stainless Steel

UNS: S32205/S31803 vs S32750

Cr content: ~22% vs ~25%

Ni content: ~5-6% vs ~7%

Mo content: ~3% vs ~4%

PREN: 35-38 vs ≥ 42

Yield Strength: ≥ 450 MPa vs ≥ 550 MPa

Resistance: High vs Very High

1. Corrosion Resistance

2507 has superior pitting, crevice, and SCC resistance due to higher Cr, Mo, and N content (PREN ≥ 42).

Recommended for seawater, offshore, and high-chloride environments.

2205 offers excellent general corrosion resistance for tanks, pipes, and structures in less aggressive conditions.

2205 vs 2507 Duplex Stainless Steel

2. Mechanical Properties

2507 provides higher strength:

- Yield Strength: 550+ MPa vs 450+ MPa
- Tensile Strength: 800-1000 MPa vs 620-880 MPa

It allows for weight-saving designs but is less ductile than 2205.

3. Weldability and Fabrication

2205 is easier to fabricate and weld, with greater tolerance for heat input. 2507 requires tighter welding control and may need post-weld treatment.

4. Temperature Range

Both grades are suitable up to 300°C. Extended exposure above this range can cause phase imbalance and embrittlement.

5. Cost and Availability

2205 is more affordable and readily available. 2507, with higher alloy content, is more expensive and requires careful processing.

6. Applications

2205: chemical processing, tanks, bridges, general structural

2507: desalination, offshore platforms, seawater piping, aggressive environments

Summary:

- Use 2205 for cost-effective solutions in moderate conditions.
- Use 2507 for maximum corrosion resistance in critical environments.

2205 vs 2507 Duplex Stainless Steel

Standards:

- ASTM A240/A276/A789/A790, ASME SA240, EN 10088-2, NACE MR0175

Selecting the right duplex stainless steel is essential for long-term performance, safety, and cost-efficiency in demanding environments.