



**STAINLESS STEEL BALUSTRADE
AND HANDRAIL PRODUCTS**

Tel: (08) 9302 3686

Fax: (08) 9200 5673

sales@metforce.com.au

**Warehouse – 86 Furniss Road,
Landsdale, 6065, WA**

Postal - P O Box 194, Joondalup DC

**6919, WA, Australia
ABN 95 132 832 065**

WHY USE DUPLEX 2205

Before we start –

Metforce assumes no risk and shall not be subject to any liability for any indirect, special, incidental, or consequential damages or for any loss of profits sustained by buyers or any party dealing with buyers in connection with the information contained in this report or resulting from the use or application of any of the recommendations contained in this report. The buyer is ultimately responsible for making all decisions and applying the appropriate technology based on good engineering practices.

Firstly, what is Duplex 2205, in simple terms?

Also known as S31803 or 1.4462, this material is a stainless steel which has enough Chromium to form an Austenitic crystal structure and therefore it consists of a mixed structure which is both Austenitic and Ferritic.

With the controlling of Nitrogen in the composition, the structure is around 50% Austenite and 50% Ferrite.

Failure to control the Nitrogen may hinder the Austenite formation which will affect the weldability and other properties.

Because of its high Chrome content, it has superior corrosion resistance in most environments to grade 316 or 316L.

Invented only recently (in the last 30 years) it is replacing grade 316 in many marine environment applications.

How good is it in marine conditions?

Let me illustrate using tables by SWCC.gov:

In a salt spray fog chamber -

Grade	Corrosion rate x 10 ⁻³ mpy	
	After 3024 hours	After 4824 hours
316L	2,9150	4,4475
2205	0,1909	2,1731

In natural sea water at 50 deg C -

	E pit mv (resistance to pitting)	
	304L	316L
304L	94	154
316L	154	156
17-4PH	156	629
2205	629	

For coastal areas it is far superior to grade 316 or 316L

It may still stain if not maintained, but pitting will take longer to occur.



**STAINLESS STEEL BALUSTRADE
AND HANDRAIL PRODUCTS**

Tel: (08) 9302 3686

Fax: (08) 9200 5673

sales@metforce.com.au

**Warehouse – 86 Furniss Road,
Landsdale, 6065, WA**

Postal - P O Box 194, Joondalup DC

**6919, WA, Australia
ABN 95 132 832 065**

What does it contain?

	<u>316</u>	<u>2205</u>	(min %)
Chrome	16%	21%	
Nickel	10%	4.5%	
Molybdenum	2%	2.5%	
Nitrogen	-	0.08%	

What are the mechanical properties?

	<u>316</u>	<u>2205</u>
Ultimate Tensile MPa	515	700
0.2% Proof Strength	205	570
Hardness HRB	95	235

Is it easy to weld?

2205 can be welded using most forms of welding, however you should use filler material. Distortion and associated stresses should be less with 2205 due to the lower co-efficient of thermal expansion due to its duplex structure.

How easy it is to machine and cut?

Machining is harder than 304 or 316 and you will use more consumables. Cutting speed is about 20% slower.

Typical Applications?

Marine environments where excessive chloride is present.
Pulp and Paper plants.
Chemical plants.
Hot water systems.
Oil and Gas plants and platforms.

Is it better for clamping products, such as glass clamps and spigots?

Definitely.
From our experience, “Splaying” is around 50% less when using 2205.

Extra cost?

Generally 2205 costs around 20% more than 316L.
The additional cost is not only caused by using superior casting mills, but extra machining, extra polishing and more consumables. Also, 2205 raw material used in casting is harder to find. Some manufacturers cheat and do not offer a real duplex, where the duplex molecular structure is not achieved because the Nitrogen is not managed. Very few mills can manage the Nitrogen which is generally only achieved in using a Vacuum furnace. Testing equipment used to measure Nitrogen accurately is also not your typical Spectrometer.

If you have any questions, please speak to us at Metforce.