

aperam

Duplex stainless steels for every application





High corrosion resistance, durability, formability, ease of use and low maintenance requirements - these are just a few of the characteristics that make duplex stainless steels the material of choice for industrial applications.

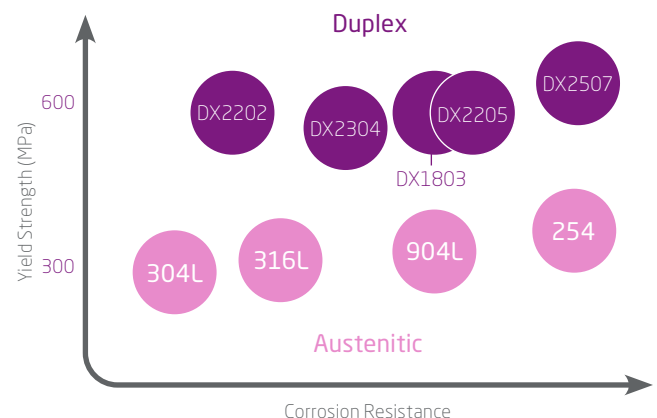
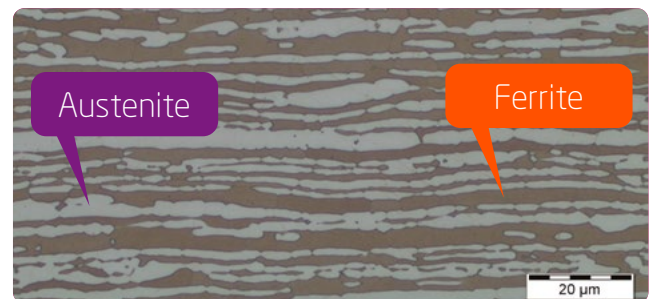
What is Duplex?

Two-phase microstructure

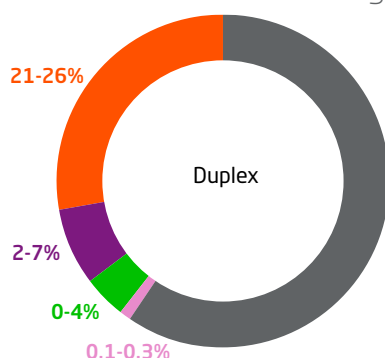
Duplex is a family of stainless steel grades that contain a mix of austenitic (γ) and ferritic (α) phases. While the ferritic phase provides the strengthening, the austenitic lattice enables ductility and toughness.

It's this two-phase structure that gives duplex stainless steels an elevated yield strength. In fact, duplex stainless steels are nearly twice as strong as austenitic grades.

This mixed structure also means duplex have good resistance to both stress corrosion cracking and intergranular corrosion while maintaining a sufficient level of ductility. Furthermore, duplex's low nickel content and high strength enable the use of thinner sections, bringing significant cost benefits to the end user.



The Duplex Formula



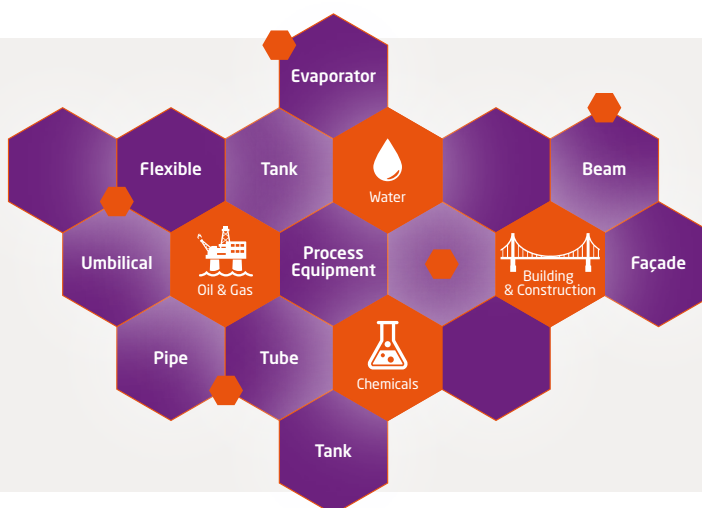
Stainless steels are alloyed steels that have a chromium content greater than or equal to 10.5% and a carbon content less than or equal to 1.2%, with iron as the main element.

Aperam duplex stainless steels typically contain: 21 – 26% chromium, 2 – 7% nickel, 0 – 4% molybdenum, 0.1 – 0.3% nitrogen and only 0.02% carbon.

Chromium - Nickel - Molybdenum - Nitrogen - Iron



Duplex Markets



Duplex stainless steels are renowned for their ability to withstand even the most extreme environments. That's why they are the material of choice for the desalination, water treatment, Oil & Gas, industrial equipment, transportation and building & construction sectors.

Desalination and Water Treatment

Desalination and water treatment applications demand a durable material that can withstand the corrosiveness of water, liquids and salt. That material is duplex stainless steel.

Thanks to its excellent strength, corrosion resistance, long life-span, and cost effectiveness, the benefits of using duplex stainless steel far exceed the initial costs of investment.



Desalination and Water Treatment (continued)

Focus: Az Zour North

To meet its targeted freshwater capacity, Kuwait's Az Zour North thermal desalination plant required the construction of 10 evaporators. For this, they turned to SIDEM, a subsidiary of Veolia Group and a leading specialist in the design of thermal desalination technologies.

The company's Multi-Effect Distillation (MED) technology uses Aperam's DX2304 duplex stainless steel, which offers high mechanical properties and gives the user the ability to adjust the duplex grade based on in-use aggressiveness.

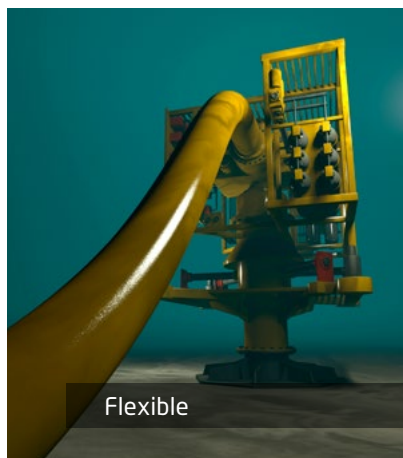
In total, Aperam supplied 3,000 t of DX2304 to SIDEM's subcontractors to build the evaporators and their related piping systems.



Oil & Gas

The Oil & Gas industry demands a material that offers excellent corrosion resistance, versatility and strength. Duplex stainless steel checks all the boxes.

Duplex stainless steel's high strength and resistance against chloride stress corrosion cracking make it particularly well-suited for offshore applications that operate at high pressures and great depths. Duplex is also a material of choice for onshore pipelines transporting corrosive fluids. That's why the oil and gas industry continues to be the largest user of duplex stainless steels, including Aperam's DX1803, DX2205 and DX2507 grades.



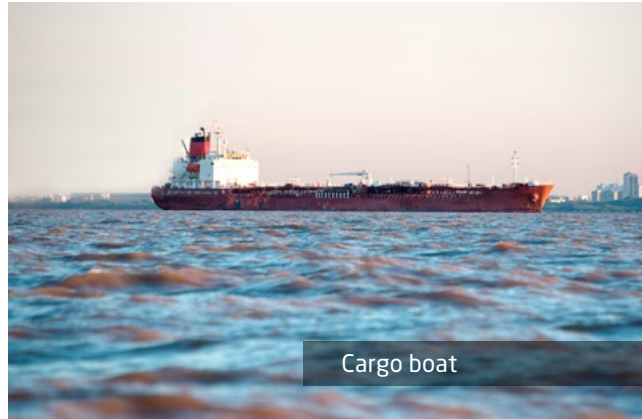
Transportation

Many aspects of society are premised on having an efficient system for transporting both goods and people. Whether this movement happens by boat, plane, train or automobile, all depend on duplex stainless steels.

For example, truck tanks and trailers made from such high-strength stainless steels benefit from an unmatched level of efficiency, durability and corrosion resistance. They are also more cost-effective than conventional carbon steel options.

In the maritime sector, duplex stainless steels are used in everything from the hull of a ship to the chemical tanks and shipping containers these ships carry. They are also used in the exhaust scrubber equipments.

Even the rail sector is taking advantage of duplex stainless steel, leveraging its excellent energy-absorption and resistance to corrosion to improve the safety of passenger railcars.



Cargo boat



Tanker truck



Trains and trams

Focus: the material of choice for buses and coaches

Duplex stainless steel's excellent corrosion resistance, elongation and energy absorption properties make it an ideal material for the manufacturing of bus structures.

As a case in point, take Stalatube. A global leader in the manufacturing of developed stainless steel hollow sections and components, Stalatube produces square and rectangle section tubes made of Aperam DX2202.

For electrical buses, the reduction in weight achieved by using duplex stainless steels helps offset the added weight of the batteries.



Buses and coaches

Equipment

Because duplex is strong, durable and easy to clean, it has become the material of choice for a range of industrial equipment, including food and beverage storage containers, pipes, tanks, pressure vessel and heat exchangers. Thanks to its excellent corrosion resistance, duplex stainless steel storage containers last a lifetime – with little to no maintenance required. This resistance to corrosion also means that duplex stainless steel doesn't require the addition of a protective coating, giving it a cost advantage over other, less-durable materials.

This corrosion resistance and mechanical strength is also why duplex stainless steel is widely used by the pulp and paper industry, particularly Aperam DX2304 and DX2205 grades. Duplex stainless steels are also a high-performance solution for new flue pipes and for lining existing flues. And as the amount of stainless steel used in industrial and domestic heat exchange equipment continues to increase, Aperam is working directly with manufacturers and users to understand their challenges and develop solutions that satisfy present and future needs.



Piping equipments



Tanks



Pressure vessels and heat exchangers



Tubes

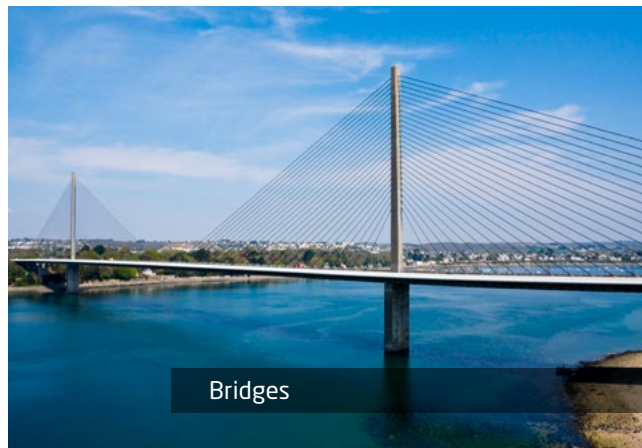
Building & Construction

Duplex stainless steels are redefining what's possible in architectural design. Offering a unique combination of durability and aesthetic appeal, these grades are particularly well-suited for roofs, façades and bridges.

Duplex stainless steels provide the freedom of form and flexibility in appearance needed to blend into all types of environments and architectural styles. Not only is stainless steel long-lasting, easy to maintain and recyclable, it can also be used with a variety of construction systems.

Likewise, duplex stainless steel can be found in all or any part of vehicle and pedestrian bridges, including the bridge's handrails and banisters, in the wires on suspension bridges, and in cables and tie rods.

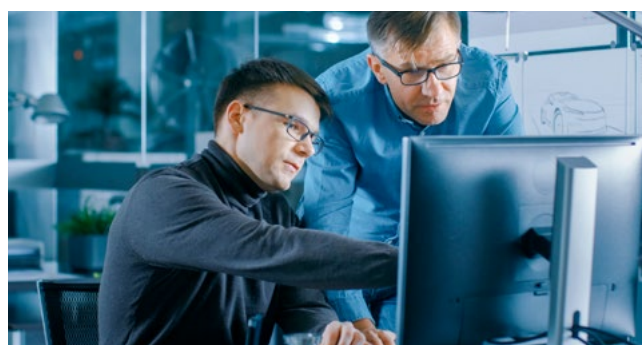
It's also a popular material for the deck and for anchor elements, including those bridges built in marine and polluted atmospheres. For these types of applications, we recommend our DX2205 or DX2304 duplex grades.

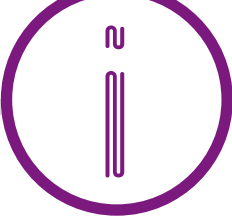


Spotlight on R&D

Comprised of 142 employees and a network of partnerships - and backed by a budget of € 20 million - Aperam's Research and Development team is fundamental to our positioning as an industry leader and the development of our most recognizable brands.

We can also help co-develop the high-quality, innovative products you need to stay at the forefront of an always-evolving industry. Our engineers can assist with everything from designing new medium- to long-term projects to optimizing your manufacturing process, evaluating how to reduce costs and providing the technical training your team needs to succeed.





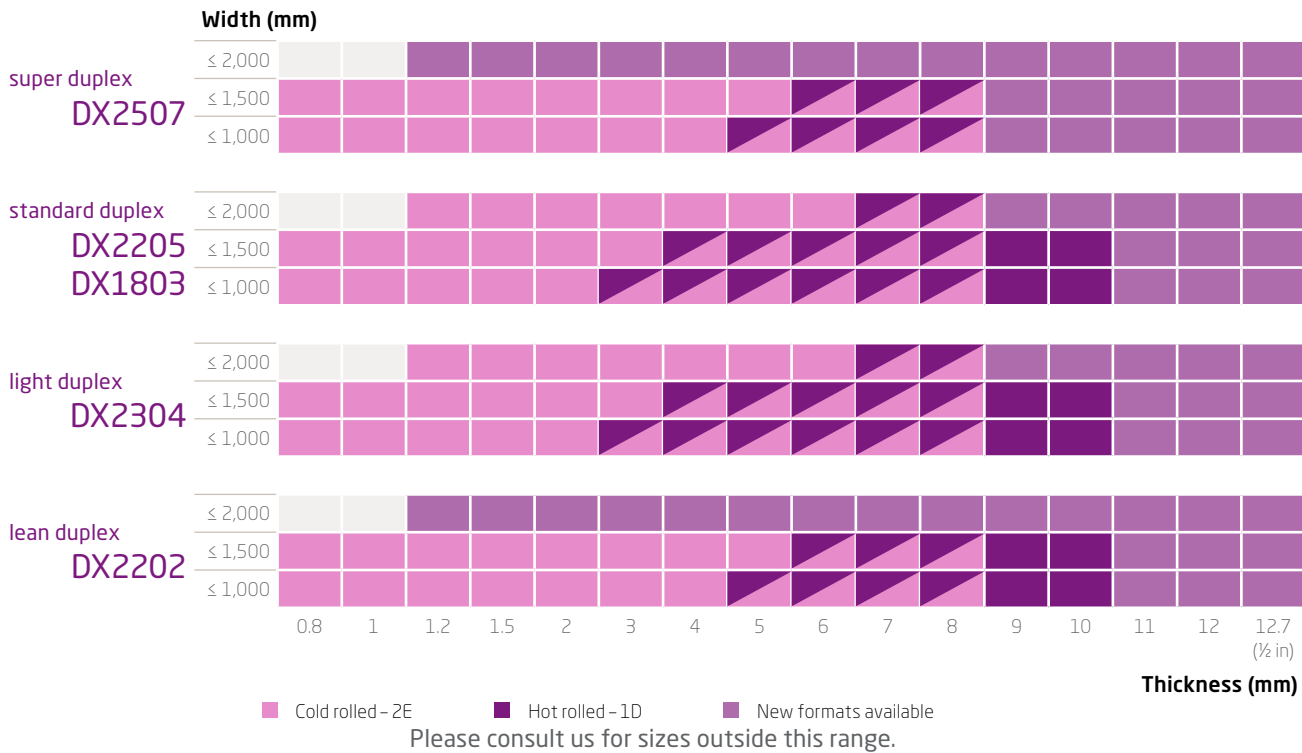
An Extensive Portfolio

Aperam offers an extensive range of duplex stainless steels. Our duplex flat products are available in dimensions up to 10 mm thick and 2 m wide, each of which is backed by our in-depth knowledge and industry-leading expertise.

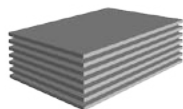
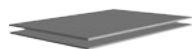
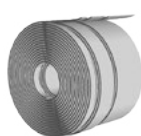
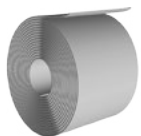
Aperam denomination	Standards		Building and construction	Pressure vessel standards			JIS	IS	Available with Aperam for Oil & Gas standards	Notes
	ASTM A240 UNS number	EN10088-2	EN10088-4	ASME SA-240 BPVC UNS number	EN10028-7 PED 2014/68/EU	VdTÜV AD2000-W0	G4304 & G4305	6911		
DX2507	S32750	1.4410	1.4410	S32750	1.4410	WB508	SUS 327L1	2507	NACE MR0175 - ISO 15156-3 NACE MR0103 - ISO 17945 Norsok MDS D55	Type 2507 Superduplex
DX2205	S32205 S31803	1.4462	1.4462	S32205 S31803	1.4462	WB418	- SUS 329J3L	2205 1803	NACE MR0175 - ISO 15156-3 NACE MR0103 - ISO 17945 Norsok MDS D45	Type 2205 Duplex with Mo mini 3%
DX1803	S31803	1.4462	1.4462	S31803	1.4462	WB418	SUS 329J3L	1803		Duplex with Mo 2.5%
DX2304	S32304	1.4362	1.4362	S32304	1.4362	WB496	SUS 323L	2304	Ongoing for "Norsok" offshore standard	Type 2304 Standard lean duplex
DX2202	S32202	1.4062	-	S32202	1.4062	WB557	-	-	-	Lean duplex only from Industeel, Ugitech & Aperam

Size Range

Up to
2 m wide



Our duplex products are available in Coils, Strips and Sheets. DX2205 / DX 1803 / DX2304 are also available in heavy plates delivered by Aperam South America in thicknesses starting from 14 and up to 40 mm and in widths up to 1,300 mm.



Certifications & Approvals



A Global Company with a Local Presence

Aperam is the leading stainless steel and specialty steels company in South America and the second largest in Europe. We are also a leading manufacturer of high value added specialty products, including electrical steels and nickel alloys. All of our products can be supplied from Europe or Brazil.



Europe

DX2507 / DX2205 / DX1803 / DX2304 / DX2202

Genk: Meltshop
Châtelet: Hot-Rolling Mill
Genk: Cold-Rolling Mill
Isbergues: R&D Centre

Brazil

DX2205 / DX1803 / DX2304

Timóteo: Meltshop, Hot-Rolling Mill,
Cold-Rolling Mill and R&D Centre

Your Supplier of Choice

Our wide and always-evolving product portfolio is well-positioned to answer our customers immediate application needs. We also maintain an industry leading product pipeline filled with the applications that will help define the future.

But Aperam is more than just products. We firmly believe that our success ultimately depends on your confidence in using our products. That's why we support all our customers through technical assistance and product co-development.

Our global presence includes 15 sales offices, 15 service centres and 5 transformation centres, meaning no matter your location, Aperam can provide local, on-the-ground assistance. For more technical requests, our Stainless Steel Research Centre serves as a one-stop-shop for all technical questions relating to the production and use of duplex stainless steels.



Want advice? Have a question?

Need help choosing the right duplex stainless steel grade for your project?

Contact our team of experts today!



www.e-aperam.com

Contact us

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