

316A Stainless Steel



ENGINEERED BY
Aperam
INNOVATION
LAB
ENGINEERED BY

You Can Keep Paying More,
but Does That Really
Make Sense?

Aperam

High-Performance Stainless, Services, Innovation and Sustainable Expertise

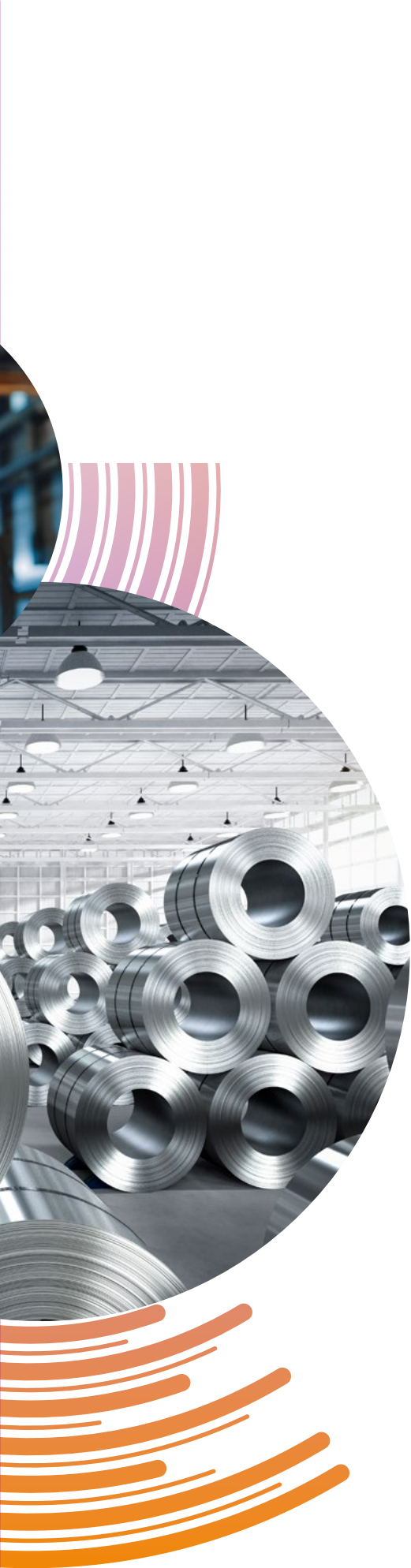
Aperam is a global producer in stainless steel, electrical steel, alloys, specialty steel and recycling. With six industrial sites in Europe and South America, the company offers a full range of grades and dimensions for demanding industrial applications. Its integrated model ensures product reliability, supply chain efficiency and consistent quality.

In addition to material supply, Aperam delivers advanced technical services: dimensional customisation, forming and welding support, and just-in-time logistics. Its network of Service Centres and processing facilities supports customer-specific needs across more than 40 countries.

The Aperam Innovation Lab plays a key role in developing new material and co-developing solutions with customers. From feasibility studies to industrial testing, the R&D team provides in-depth expertise in metallurgy, corrosion science and process optimisation.

As a key player in circular metallurgy, Aperam integrates a closed-loop recycling model through its Recycling & Renewables division. Its low-carbon production approach includes the use of FSC®-certified charcoal and scrap-based inputs. Products labelled under the Aperam infinite™ brand offer up to 85% CO₂ reduction compared to industry averages, helping customers reduce their own scope 3 emissions and align with EU taxonomy goals.





Challenging Stainless Steel

Choices in a New Competitive Era

In today's international environment, manufacturers are under increasing pressure to find new ways to curtail costs without compromising the performance or durability of their products. Material innovation ticks all the boxes. Innovative new materials can help mitigate the volatility of raw material prices, the hidden costs of manufacturing inefficiencies, and the margin-eroding effects of over-specification. They can also help satisfy customer demand for durability, ease of use and faster time-to-market. But the costs of such innovation cannot outweigh its benefits. That means manufacturers and users must have a clear view of all technical and operational consequences, performance requirements and cost structures at the outset of the innovation process.

Materials Innovation Serving Industrial Competitiveness

Engineered by Aperam's Innovation Lab, **316A** is the result of a targeted effort: to develop a stainless grade offering 316L-level performance, but at a lower cost. Early research revealed that a new alloy balance that reduces Molybdenum in favour of Silicon could achieve equivalent corrosion resistance, without altering the forming or welding properties. Over time, this hypothesis was refined and validated in Aperam's facilities and by industrial customers.

A new, cost-effective, plug-and-play grade by Aperam is born: 316A.

How Aperam's Exclusive 316A Grade, Can Lower Your Stainless Procurement Costs While Maintaining or Improving Performance

Lowering costs to safeguard margins and market competitiveness

By reducing manufacturers' dependence on high-cost alloying elements, 316A lowers the alloy surcharge by up to 25% compared to 316L.



Furthermore, it reduces exposure to surcharge volatility by up to 30%, thus enabling more predictable budgeting in unstable markets.

Compared to alternative materials, 316A also offers a stable and highly competitive total price – creating an option to upgrade products without increasing costs.

For example, even though 316L is often the ideal grade for façade cladding, many users opt for the less expensive and less corrosion resistant 304 grade. But now, with 316A, they can upgrade to the benefits of 316L without paying the costs.

*Reminder: The full price is composed of the **base price** + **the alloy surcharge**

No investment or change to production processes required

Switching materials often comes at a cost. Process adjustments, new equipment, and operator training can quickly offset the benefits of lower raw material prices. In contrast, 316A is designed for complete compatibility.

It can replace 316L without any modification to forming, welding or surface treatment processes. This means no downtime and no additional CAPEX – ensuring that cost savings are not erased by hidden costs. A seamless transition helps keep resources focused on production, not adaptation.

Preserving or enhancing final product performance

A lower price should not mean lower quality. 316A was developed to ensure equivalent or improved performance in key criteria. Corrosion resistance, forming, welding and brazing capabilities remain fully aligned with 316L.

In brazing applications, 316A even shows improved results. This makes it a credible option not only for cost-driven substitutions, but also for quality-driven applications seeking supply stability.

Performance comparison			
		Aperam 316A	316L
Mechanical Strength	Room T °C	++	++
	Cryo (-75 °C)	+++	++
	High T° (500 °C)	+++	++
Stamping (FLC)		++	++
Welding		++	++
Brazing		+++	++
Corrosion		++	++

Compliant with international standards & requirements

- ✓ 1.4682 under EN 10088-2
- ✓ S30416 under ASTM A240
- ✓ CE marking requirements for construction products (Regulation 305/2011/EU)
- ✓ EHEDG hygiene guidelines for surface roughness in food contact equipment
- ✓ EU food safety regulations EC No. 1935/2004 and EC No. 2023/2006
- ✓ DVGW certificate (Germany) proves the grade is equivalent to 316L for gas and water
- ✓ Independent testing by the Bundesanstalt für Materialforschung und -prüfung (BAM) confirms similar performance of 316A vs. 316L for drinking water (EN 16056:2023)



Enabling a lower carbon footprint product design

Material decisions directly influence the environmental footprint of finished products. With 316A, cost reduction does not compromise carbon performance. Manufactured using high scrap content, it helps products align with European carbon footprint requirements and contributes to EU

taxonomy objectives. For producers operating under scope 3 emission constraints, 316A offers an opportunity to decarbonise without redesigning. Choosing this grade supports a responsible transition, both economically and environmentally.

Rethinking Materials Choices Under Cost and Performance Pressure

In a highly competitive global context, European industry is under strong pressure to lower procurement costs and shorten innovation cycles. Stainless steel buyers are facing multiple challenges: volatile prices for alloying elements, hidden costs in complex supply chains, increasing requirements for product durability and a demand for a reduced time-to-market. Every material decision has operational, financial and environmental implications. Now more than ever, it is essential to re-evaluate long-established material choices with a clear view on their technical, process and total cost impacts.

Materials Innovation Serving Industrial Performance

Developed by Aperam's Innovation Lab, the 316A grade delivers the corrosion resistance of 316L, with significant cost savings. The breakthrough lies in its innovative alloy design: the optimisation and synergy between silicon and molybdenum allow for a lower-cost formulation without compromising performance. The result is a drop-in alternative to 316L — no change in processing.

“For decades, the engineering community has relied on 316L for its predictable corrosion resistance in harsh chloride environments. When a new material claims to be a substitute, the scrutiny is rigorous. After laboratory testing and reviewing the comprehensive Aperam data, the corrosion resistance of the new 316A shows more than just technical equivalence to 316L. It demonstrates a practical innovation. The unique synergistic effects between alloying elements, including Si, provide robust pitting and crevice corrosion resistance comparable to 316L, while also forming a thicker passive layer with some particular structural characteristics. This enhanced corrosion performance achieved through a unique chemical composition optimization is certainly a significant advancement, paving the way for a new generation of high-performance alloys with potentially enhanced surface chemistry performance.”

Vincent Vignal

Director of Research at the National Centre for Scientific Research (CNRS, France)





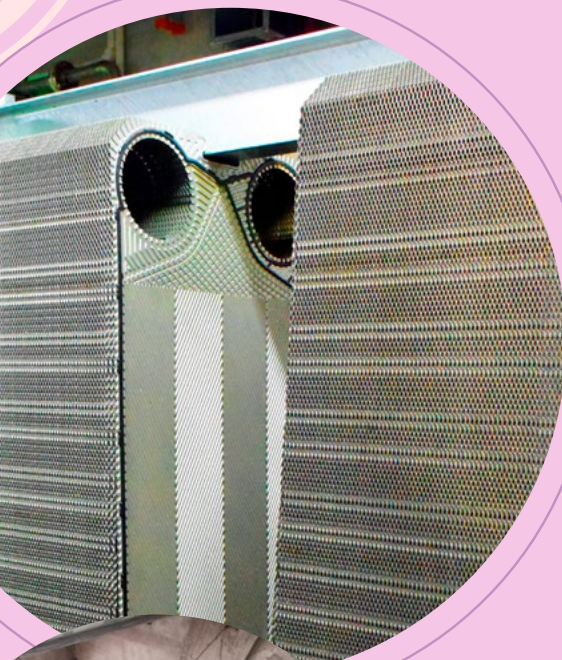
Key Sectors that Benefit the Most from 316A

Construction and architecture

Structural robustness, corrosion resistance, and aesthetic quality are critical in building applications (e.g. roofing, façades, flue pipes). 316A offers high durability for external architectural elements and structural parts exposed to atmospheric conditions. It provides a cost-effective alternative to 316L when higher corrosion resistance is needed than what 304L can deliver.

Food and cosmetics processing

Processing environments require materials that withstand aggressive cleaning agents and ensure hygienic design. 316A meets corrosion resistance standards and offers a smooth surface finish, supporting cleanability and regulatory compliance. Its proven formability and weldability facilitate the production of complex equipment, from piping to tanks.



HVAC systems

Heating, ventilation and air conditioning systems demand reliable materials that resist moisture, airborne contaminants, and temperature fluctuations (e.g. heat exchangers, heat pumps, etc.).

316A provides resistance to pitting and crevice corrosion, maintaining structural reliability over time. It also offers excellent forming and welding characteristics, enabling efficient and robust system assembly.

Additional markets

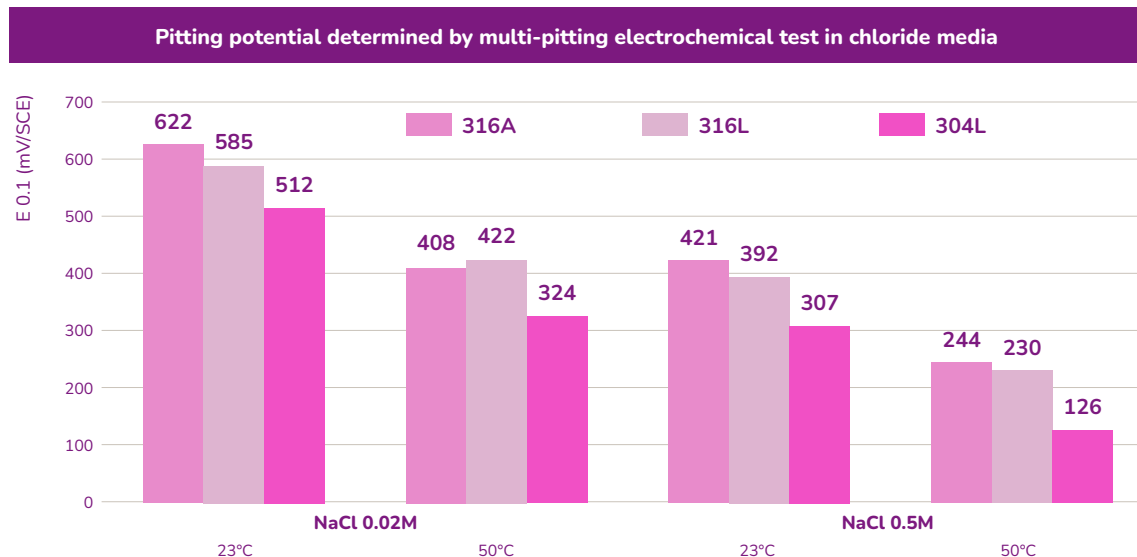
316A is also a valuable option for a wide range of applications:

- > Industrial machines
- > Road and maritime transport (tanks, trailers)
- > Pulp & paper industry equipment
- > Wastewater treatment equipment
- > Carbon capture assets (CCUS)
- > Mobility components
- > Outdoor & street furniture



316A: Same Technical Performance as 316L

Corrosion resistance: proven equivalence in aggressive environments



Under most tested conditions, 316A exhibits a higher pitting potential than 316L, offering improved protection against localized corrosion.

To validate 316A as a viable alternative to 316L, corrosion testing simulated severe operating conditions. Electrochemical tests confirmed its equivalent—or superior—pitting resistance in both marine-type (0.5M NaCl) and highly chlorinated (0.02M NaCl) solutions.

In addition, a 1000-hour salt spray test confirmed that both grades show comparable resistance, with no notable differences in weight loss or surface degradation.

This ensures that 316A can be used in environments with high chloride exposure such as marine systems, chemical processing lines, food and pharmaceutical installations, and water treatment infrastructure.



Visual inspection before and after the salt spray test further confirmed general corrosion resistance parity with 316L.

Mechanical properties:
cold forming compatibility and structural integrity

316L stainless steel is widely used due to its excellent ductility, consistent mechanical response, and adaptability to cold-forming operations such as deep drawing and stamping.

Aperam's 316A grade mirrors these performance characteristics. Developed as a plug-and-play solution, 316A ensures full mechanical compatibility with 316L: no adjustments are necessary in existing tooling setups.

Grades	European designation	ASTM A240	YS ⁽¹⁾ (MPa)	UTS ⁽²⁾ (MPa)	A% ⁽³⁾	n ⁽⁴⁾	r ⁽⁵⁾		
							RD	TD	D45
304L	1.4307	304L	300	650	54	0.42	0.9	0.8	1.15
316L	1.4401/1.4404	316/316L	300	620	52	0.42	0.6	1.05	1.2
316A	1.4682	UNS30416	330	630	50	0.37	0.9	0.9	1.2

1 MPa = 1 N/mm² | Typical values
Tensile test along transverse direction (TD)
(1) Yield Strength (YS)
(2) Ultimate Tensile Strength (UTS)
(3) Elongation (A%)
(4) Hardening coefficient
(5) Lankford coefficient | RD = Rolling Direction | TD = Transverse Direction | D45 = 45° Direction

“In professional large-scale kitchen environments, the highest standards of hygiene, material resistance, and durability are essential. As a manufacturer of high-quality, mobile kitchen equipment made from stainless steel, we at Rieber rely on materials that can permanently meet these demands. The new 316A stainless steel impresses us with its excellent resistance to chloride-based cleaning agents, its enhanced pitting and crevice corrosion resistance, and its stable passive layer – a clear technological advancement over conventional grades.

In addition, 316A offers improved thermal conductivity, making it particularly suitable for use in microwave-compatible applications. Compared to 1.4301, it provides significantly higher corrosion resistance — a real advantage in the take-away and to-go sector, especially with salty foods such as French fries, which place much greater stress on the material.

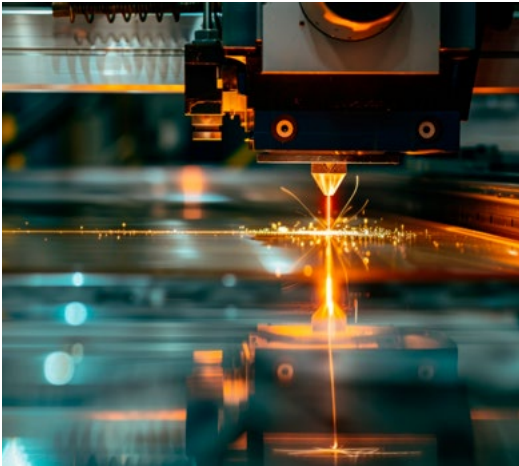
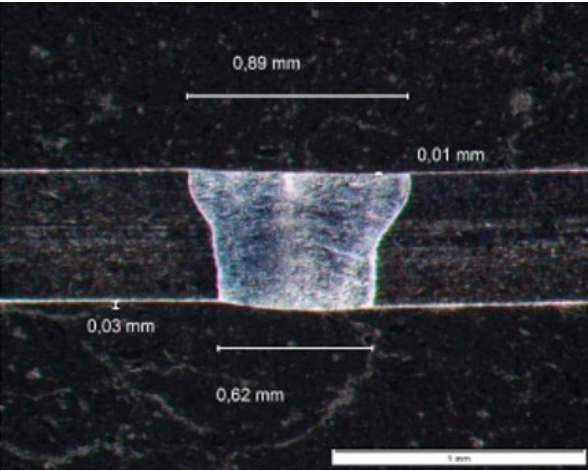
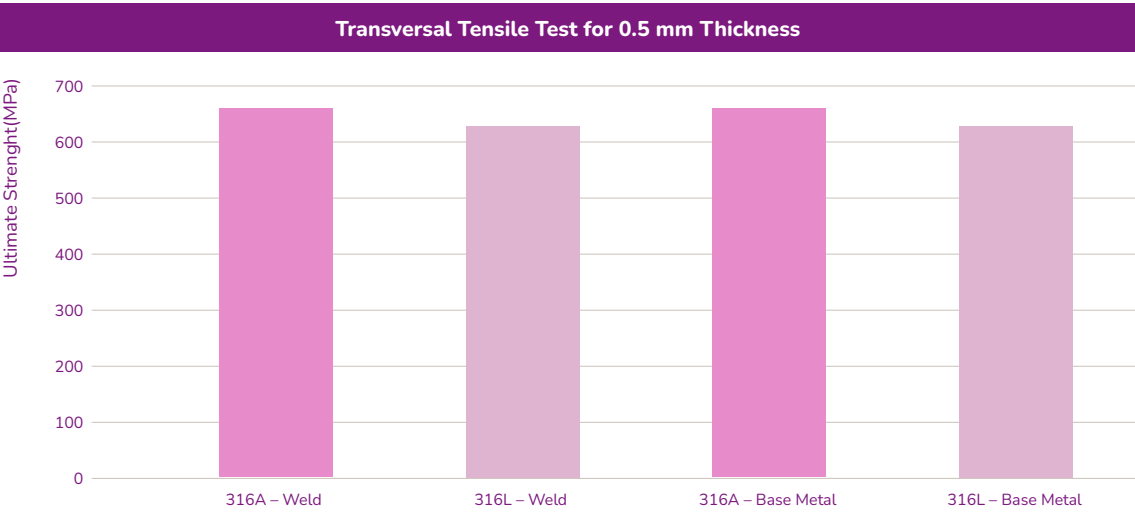
Last but not least, 316A is extremely durable — a crucial factor in the out-of-home market, where robustness and a long product lifespan directly contribute to sustainability and resource conservation throughout the entire product life-cycle.

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Ingo Burkhardt
CTO, Rieber GmbH & Co. KG

Laser welding: compatibility without process adjustments

In modern manufacturing, the integrity of welded joints is as critical as the base material. To ensure a smooth substitution from 316L, 316A was tested using identical laser welding parameters. These tests confirmed that 316A matches 316L. The resulting welded parts exhibit slightly higher strength, a fact demonstrated by

both transverse and longitudinal tensile tests. This offers a clear advantage for fabricators: they can adopt 316A without adjusting their existing welding processes, while also benefiting from improved post-weld mechanical properties. It's a direct enhancement in performance, achieved without any process modifications.

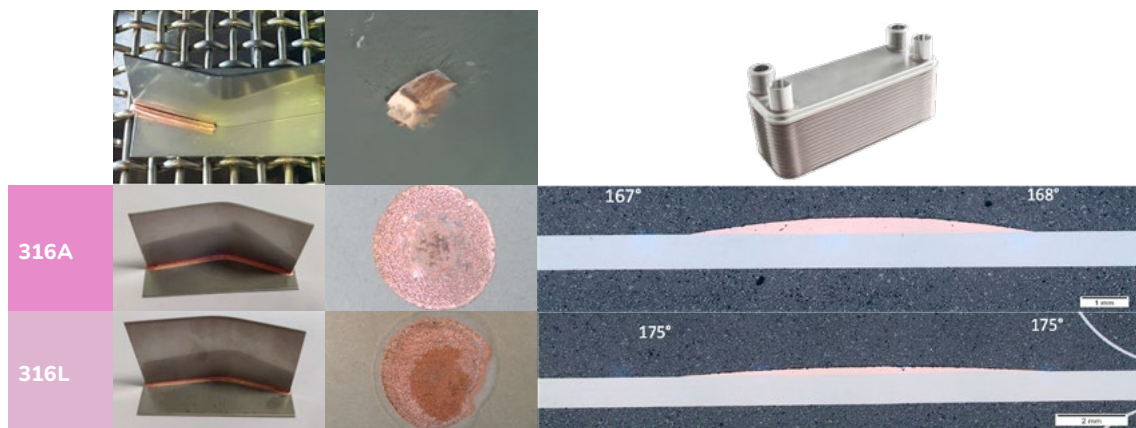


Laser Power (W)	700
Welding speed (m/min)	3

Brazing: a perfect control

In the manufacturing of plate heat exchangers, the quality of the brazed joint directly determines the unit's efficiency, reliability, and service life. 316A has been specifically engineered for this critical application, offering excellent brazing behaviour with copper. The alloy ensures

precise wetting and capillary action, guiding the filler material exactly where required. As a result, joints are cleaner, with minimal copper residue or risk of leakage – essential for preserving both the integrity of complex internal channels and the visual quality of the final assembly.



“Engineers often face a difficult trade-off. While grades such as duplex, martensitic, and ferritic stainless steels offer specific advantages, they often introduce some complexities in welding and brazing.

This is where the innovation behind 316A becomes particularly relevant. It provides corrosion resistance equivalent to the 316L benchmark while maintaining a fully austenitic structure — renowned for its excellent weldability. As a result, engineers can meet performance targets without needing to adopt more complex material families.

Extensive testing across all common joining processes confirms that 316A consistently delivers high-quality, reliable joints using the same welding and brazing parameters as 316L. There are no new tools to invest in, no settings to change, no new procedures to learn. This 'plug-and-play' reality isn't just a laboratory finding; it has been confirmed by every customer who has tested 316A in their own production environments.

Bertrand Petit,
Aperam Research Welding Engineer (IWE)

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