



## Stainless Steel Solutions for Building and Construction

ACCUEIL

Aperam is a global leader in stainless steel solutions, offering a multitude of effective, innovative and environmentally friendly products - each tailored to meet our customers' expectations.

Aperam stainless: a stainless steel solution for every customer.

With the Uginox brand, we offer the market's most comprehensive and innovative range of surface finishes ready to meet a variety of expectations.

We are widely recognised by project managers, developers, architects and contractors for our long standing expertise in the construction sector.

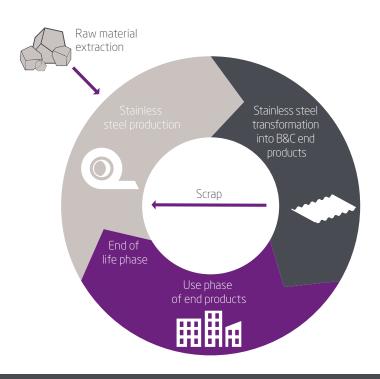
We anticipate the new requirements of our end users and, thanks to our global presence, we support our customers with everything from technical assistance to product co-development.





### A 100% recyclable product

- > Stainless steel is the "green material" par excellence and is infinitely recyclable. Within the construction sector, its actual recovery rate is close to 100%.
- > It is environmentally neutral, inert and, when in contact with elements such as water, it does not leach compounds that might modify its composition. These qualities make it a material that is ideally suited to such building and construction applications as roofs, facades, rainwater recovery systems, domestic water pipes and swimming pools, as well as bridges and pedestrian bridges.
- > Stainless steel's longevity fulfils the requirements of sustainable construction.
- > A suitable choice in terms of grade, surface finish, installation and maintenance guarantees the user an unrivalled service life.
- Construction components made of stainless steel come ready to install, thus reducing pollution (noise, dust, etc.).
   Furthermore, during demolition, these components can be salvaged for re-use in recycling, thus adding even more value.





## Stainless steel, the perfect combination of performance and aesthetics for your projects







### Design

Our wide range of grades and surface finishes means you can choose a stainless steel that's right for your exact needs. All of our stainless steel options are corrosion resistant, meaning they can be adapted to any given atmospheric environment to provide your building with both continuity and sustainability.

Furthermore, our various stainless steels have excellent physical properties, even at very low temperatures. On the one hand, this allows you to use thinner pieces, providing for a lower weight per m² and, on the other hand, you can use very long pieces in single sections.

Our products are transformed and easily installed using traditional tools and machinery.

### Economic performance

Designing a building with stainless steel also means cost efficiency - especially when you consider the final cost versus the longevity of the structure.

This is the result of stainless steel's exceptional durability and almost non-existent need for maintenance.

This price stability, especially with our ferritic grades, as well as the cost of transformation and installation, is comparable to other traditionally used metals, giving stainless steel a unique competitive advantage.

### **Aesthetics**

Stainless steel gives architects a level of creative freedom in design that is rarely matched. Architects can choose from our impressive range of thicknesses and wide range of surface finishes - from the more dull to the colourful and even the most brilliant.

Stainless steel allows for the creation of complex shapes and pairs well with other materials such as glass, wood, stone, etc.

- 1 Apartment building "Lyon Islands", Lyon France M. and D. Fuksas © Erick Saillet Executed using grade 304 with Uginox Bright finish
- 2 Archives départementales du Nord, Lille France de Alzua+ / ZigZag Architecture © Sergio Grazia Executed using grade 304 with Uginox Mat finish
- 3 Island Pavilion, Wormsley, United Kingdom Robin Snell and Partners © Graham Everitt View Pictures Ltd Executed using grade 316L with Uginox Top finish

### 1. OUR SERVICES AND STAINLESS STEELS

At Aperam, our service doesn't stop with the sale. Each of our products is backed by our industry-leading commitment to service and support that last throughout your project.

### Technical Partnership

The sustainability of our products is heavily dependent on how they are used. For example, a building's exposure and its surrounding environment will all impact the stainless steel. To ensure our customers get the most out of their product, our business engineers regularly advise owners, contractors and installation companies.

Our "Stainless Workshops" – operational workshops located at our Isbergues site – train your colleagues and operatives in the use of stainless steel. Our experts, located throughout Europe, provide training in schools of architecture and design, in high schools and vocational schools specialising in building and construction.

### Product innovation

## In addition to our highly competent and dedicated stainless steel research centre, Aperam Stainless Europe can also call upon the services of all of the Aperam Group's research facilities.

We are working in conjunction with material manufacturers to enhance the performance of our steels by combining them with other materials, such as glass.

### Logistics

Our dedicated European logistics platform, located in Isbergues, ensures a service level adapted to your requirements.

Our stainless steel range for the building and construction sector is available from stock in standard formats or in made-to-measure products. A team of logistic experts dedicated to quality of service and on time delivery is at your disposal.

### Proximity to our customers

Aperam Stainless Europe has the advantage of its expansive sales network – 16 Service Centres and sales offices throughout Europe, each of which offers quality service and proximity to those involved in the construction sector.

### What is stainless steel?

Steel is an alloy of iron and carbon.

Stainless steels are steels containing less than 1.2% carbon and at least 10.5% chromium, along with other alloying elements.

The chromium content provides stainless steel with its corrosion resistance, enabling the natural and continuous development of a chromium oxide surface layer.

This oxide, referred to as the "passivation layer", provides the stainless steel with lasting protection against all types of corrosion. This passivation layer is naturally self-healing when in contact with humidity or water.

Stainless steels' corrosion resistance and mechanical properties can be further enhanced by adding other elements, such as nickel, molybdenum, titanium, niobium, manganese, etc.



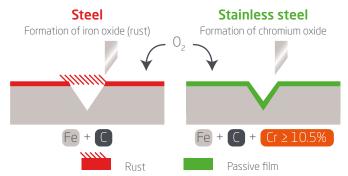
KARA is Aperam's brand of ferritic stainless steels. Unlike other stainless steels, the KARA range does not contain nickel and is thus immune from the erratic price fluctuations of this alloying element.

KARA's key advantage is that its prices are more stable over time: a strong argument in the construction sector, where project costs and economic design are key elements.

## Composition of stainless steels

## Reaction of steel and stainless steel in contact with air humidity or water





### The various categories of stainless steel suitable for building



### Stainless steel - the choice material

To guide your selection, this table compares the characteristics of the principle materials used in building, taking into account your constraints.

Properties (typical values)	304/304L	316L	K30	K36	K41	K44	DX2205	DX2304
Density	7.90	7.90	7.70	7.70	7.70	7.70	7.80	7.80
Expansion in mm/m per 100°C	1.60	1.60	1.10	1.10	1.10	1.08	1.30	1.30
Melting point in °C	1450	1440	1500	1480	1505	1495	1460	1465
Modulus of elasticity en MPa x 10 <sup>3</sup> (20°C)	200	220	220	220	220	220	200	200
Yield strength in MPa	300	300	330	370	310	380	620	550
Tensile strength in MPa	650	620	500	520	480	520	840	730
Thermal conductivity in W/m.K	15	15	25	30	25	23	16	17
Mean elongation in %	54	52	26	29	30	28	29	30

Properties (typical values)	Zinc Cu - Ti (1)	Copper DHP Cu-b1 1/4 dur <sup>(1)</sup>	Aluminium EN AW 5005 (1)	Carbon steel 1.0242 <sup>(1)</sup>
Density	7.18	8.93	2.70	7.70
Expansion in mm/m per 100°C	2.20	1.68	2.35	1.20
Melting point in °C	418	1083	660	1600
Modulus of elasticity en MPa x 10 <sup>3</sup> (20°C)	80	120	69	210
Yield strength in MPa	110/150	190	45	250
Tensile strength in MPa	150/190	260	120	330
Thermal conductivity in W/m.K	110	328	201	30
Mean elongation in %	40	25	27	19

<sup>(1)</sup> Reference of a type of zinc, copper, aluminium or carbon steel, traditionally used in building. These values are only an indication.



### 2. OUR SURFACE FINISHES

### A wide choice of surface finishes

In order to meet the diverse needs of the many styles of architecture, we offer a comprehensive range of surface finishes, from matt to bright, that can be achieved on various grades of stainless steels. All that is required is to identify the grade of stainless steel and the surface finish.

### The grade of stainless steel

Corresponds to a steel product characterised by its chemical composition. This composition has a direct influence on its resistance to corrosion and its mechanical properties.

### Surface finishes

Surface finishes are the result of mechanical or physicochemical treatment to the surface of the steel. Surface finishes can be reproduced on different grades of stainless steel.



### **Uginox Patina**

Uginox Patina is a tin-plated stainless steel available in two grades of ferritic stainless steel: K41 (0.4 mm and 0.5 mm thick) and K44 (0.5 mm thick), the latter of which can meet even the most aggressive of all atmospheric conditions.

These are coated with tin by electroplating on both sides. Tin acquires a patina over time, giving it a living character and a matt grey appearance, which is particularly popular. Tin reduces the natural shine of stainless steel and facilitates its integration into any location.

In addition, Uginox K41 and K44 are easily soldered and can be worked with in winter temperatures.

### Our recommendation

The surface finish Uginox Patina is suitable for standing seam, self supporting and cleated seam roofing, as well as for roofing accessories. However, we do not recommend the use of tinned stainless steel for vertical fascias or soffits where the desired aesthetic may be delayed due to a lack of natural rain washing.





### **Uginox Top**

Matt finish
Applications: Roofing - Facade - Interior



### **Uginox Sand**

Sand blasted finish.

Applications: Facade - Interior

Please consult us



### **Uginox Rolled-On**

Fine polished look with the qualities of a rolled-on finish Applications: Roofing - Facade - Interior



### **Uginox Linen**

Linen patterned finish Applications: Facade - Interior



### **Uginox Squares**

Chequer pattern finish Applications: Facade - Interior



### **Uginox Lozenge**

Lozenge pattern finish Applications: Facade - Interior



### **Uginox Bright**

Particularly bright and uniform surface with low roughness

Applications: Roofing - Facade - Interior



### **Uginox Mat**

Slightly bright surface with low roughness Applications: Roofing - Facade - Structure -Interior



### **Uginox Leather**

Leather look pattern Applications: Facade - Interior



### Uginox Méca 8 ND®

Non-directional, super mirror polished finish Applications: Facade - Interior



### **Uginox Coloured**

A range of coloured stainless steels: gold, champagne, blue, bronze, black Applications: Facade - Interior

### Our recommendation

It is important that the choice of surface finish be compatible with the environment. An identical grade with low roughness, like Uginox Bright, Uginox Mat and Uginox Méca 8 ND, are the finishes most resistant to corrosion because their low roughness means contaminants cannot easily attach themselves. For this reason, they are considered as "self cleaning". Our finishes are uniform and can be reproduced, especially those achieved by etching.



## 3. STAINLESS STEEL CHOICE CRITERIA

### **Chemical composition**

Commercial designations		Standards										
		ASTM		EN	Chemical composition in % (typical values)							
		Designations										
		Туре	UNS		C	Si	Mn	Cr	Mo	Ni	Other	
Austenitics	304	304	S30400	1.4301	0.05	0.40	1.10	18.20	-	8.05	-	
	304L	304L	S30403	1.4307	0.025	0.40	1.40	18.20	-	8.05	-	
	316L	316L	S31603	1.4404	0.025	0.40	1.20	16.80	2.10	10.10	-	
Ferritics	K30	430	S43000	1.4016	0.04	0.35	0.30	16.50	-	-	-	
	K36	436	S43600	1.4526	0.02	0.40	0.25	17.50	1.25	-	Nb = 0.50	
	K41	441	S43932 S43940	1.4509	0.015	0.60	0.30	17.80	-	-	Ti + Nb = 0.65	
	K44	444	S44400	1.4521	0.015	0.50	0.30	17.70	1.85	-	Ti + Nb = 0.45	
Duplex	DX 2205	2205	S32205	1.4462	0.02	0.30	1.80	22.80	3.10	5.50	N = 0.17	
	DX 2304	2304	S32304	1.4362	0.02	0.40	1.50	23	0.50	4.90	N = 0.10	









### Grade selection depends on atmospheric exposure

The choice of stainless steel grade must take into account the environment in which the material will be used. Our experts are available to help you in the selection process.

	External environment								
Commercial designations		Benign,			Urban and	l industrial	Marine		
		all levels of relative humidity	Corrosive*	Unpolluted rural	Normal	Severe*	20 to 10 km	10 to 3 km	Coastal (<3 km)
Austenitics	304/304L	V	<b>A</b>	V	<b>V</b>	<b>A</b>	V	×	X
	316L	<b>✓</b>	<b>A</b>	<b>/</b>	<b>✓</b>		<b>✓</b>		
Ferritics	K30	V	X	X	X	X	X	X	X
	K36	<b>V</b>	<b>A</b>	V	<b>V</b>	<b>A</b>	<b>V</b>	X	X
	K41	V	<b>A</b>	V	V	<b>A</b>	<b>A</b>	X	X
	K44	<b>V</b>	<b>A</b>	V	<b>V</b>	<b>A</b>	<b>V</b>	<b>A</b>	<b>A</b>
Duplex	DX 2205	V	<b>A</b>	<b>V</b>	V	_	<b>V</b>	<b>A</b>	<b>A</b>
	DX 2304	V	_	<b>/</b>	<b>V</b>	<b>A</b>	<b>~</b>	_	<b>A</b>

- ✓ Type suited to the environment.
- ▲ Type whose selection will be determined after consulting us.
- **X** Type not suited to the environment.

<sup>\*</sup>In particular, any environment or atmosphere containing corrosive substances or halogens: chlorides, fluorides, etc.



## 4. OUR SOLUTIONS FOR CONSTRUCTION SYSTEMS IN ROOFING

Affording freedom of form and appearance, stainless steel roofing blends into all environments and is suited to all styles of architecture, both new and renovation projects. Long lasting, easy to maintain and recyclable, it is also the sustainable material of choice. Our stainless steels are suited to the various construction systems presented below. For each technique, our experts are available to advise and guide you in your choice.

### Stainless steel advantages

- > Stainless offers a wide variety of shapes and finishes, perfectly adapted to all types of installation techniques (batten rolls, standing seams, self-supporting trays) and to both new and existing structures.
- Compared to other building materials, stainless steel distorts the least, enabling it to be used in long single pieces (from 1 to 20 meters depending on different national guidelines). Furthermore, the number of solders or expansion joints is reduced, allowing for quick installation whilst reducing the risk of leaks.
- > Stainless steel's excellent mechanical resistance permits the use of thin gauges (0.4-0.5mm) for a considerable material gain.

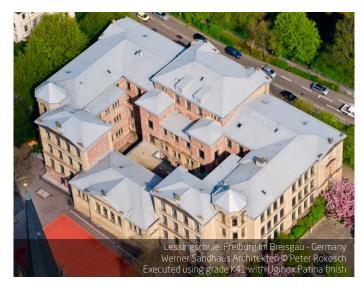




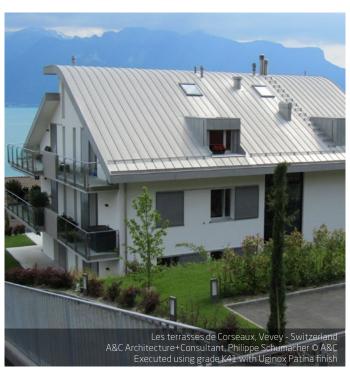














## Collection and disposal of rain water

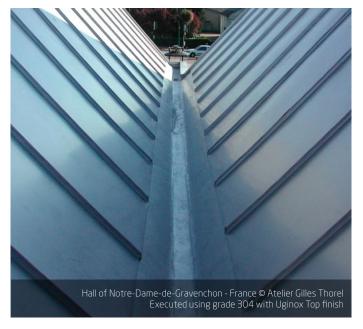
Roofing accessories are the ideal complement to a stainless steel roof.

Take rainwater collection, for example. Stainless steel enables the manufacturing of gutters and downpipes in welded sections or in continuous lengths of up to 20 m (according to the width). This reduces the number of soldered joints needed, thus enhancing the rain water collection system's integrity.

Stainless steel in thicknesses of 0.4 mm and 0.5 mm is easy to work, even in cold weather, and can be easily soldered in situ using tin solders.

Depending on component length, stainless steel can be folded in the workshop or on site using special tooling. The Uginox Patina and Uginox Top surface finishes are traditionally used for roofing accessories.









### Roofing in mountainous regions

In mountainous regions, projects must take into account the range of surface temperatures, localised or distributed snow loads, the erosion caused by snow and ice movement and the risk of siphoning.

Our stainless steels are ideally suited to this type of climate as they offer:

- > Excellent resistance to thermal shock.
- > No embrittlement in very cold weather.
- > Excellent mechanical strength, capable of withstanding heavy snow loads.

The standing seam roofing system is particularly well-suited for mountain buildings. The stable durability of stainless steel limits the number of transversal seams and weldings needed, which limits the risk of leaks and thus increases durability of your building projects.

The self-supporting roof system with a preformed stainless steel tray system is becoming an increasingly popular choice. This is both because its ease-of-use and installation make it a practical choice, and because its low cost per m² make it a smart economic choice.





# 5. OUR SOLUTIONS FOR CONSTRUCTION SYSTEMS IN FACADES

Our range of available thicknesses for each type of surface finish makes stainless steel the ideal choice for roofing and cladding.

### The advantages of stainless steel

- > Lighter envelope, thanks to high mechanical properties that permit a reduction of thickness.
- > Compatible with all types of support: metal, all types of wood, etc.
- > Possible association with construction systems giving thermal properties and/or acoustics.
- > Response to national and European thermal regulatory requirements.
- > More cost-effective than traditional products and techniques.
- All types of claddings are possible, both new and refurbished.
- > In refurbishment, the stainless steel envelope transforms and modernises the building while respecting thermal regulations and omitting thermal bridges.



Philharmonie de Paris -France Ateliers Jean Nouvel, Metra & Associés © William Beaucardet Executed using grade 316L with Uginox Bright finish















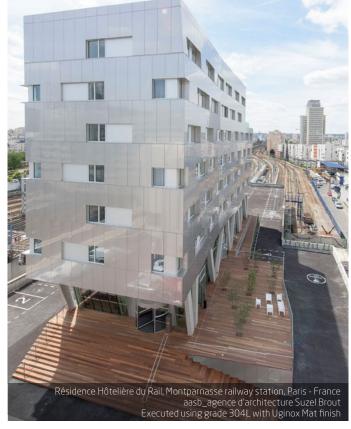








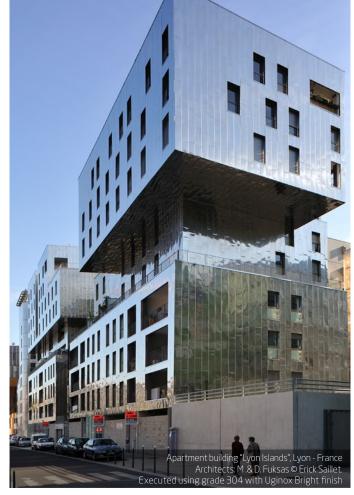


















### 6. STRUCTURES

### Swimming pools

Today, our range of stainless steels cover all requirements relating to swimming pool applications: pools (including pool edges, overflow gutters, partitions, etc.), ladders, diving boards and starting platforms, along with the water distribution system.

The grades employed are principally austenitic (304, 316L). For certain applications in harsher environments, such as the thermal spa, one can employ grades with even higher properties, such as duplex (DX2205, DX2304).





### The advantages of stainless steel

- > Stainless steel is a durable material whose appearance does not deteriorate. It is also simple to maintain.
- Stainless steel withstands variations in operating temperature typical for this type of application.
- > Unlike tiled pools, with stainless steel there is no risk of water leaking.
- > The surface properties of stainless steel plates and the assembly style of the different pieces limit the risk of bacterial growth.
- A very effective alternative to the traditional solution. Although the capital costs may be higher, operating costs are lower. Over the facility's full lifespan, the return on investment is attractive.

### Bridges and pedestrian bridges

Stainless steel can be found in all or any part of a bridge or a pedestrian bridge. Its use is common in elements of protection - handrails and banisters - as well as in the wires on suspension bridges, cables and tie rods. It is also recommended for the deck and for anchor elements, including those built in marine and polluted atmospheres, the austenitic (304, 316L) or duplex (DX2205, DX2304) grades may be well-suited.

### The advantages of stainless steel

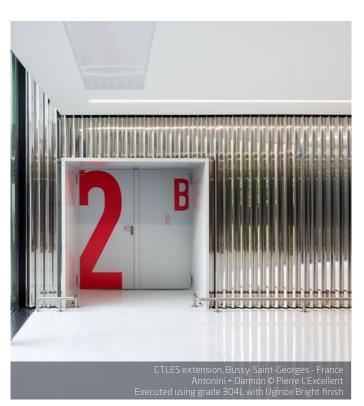
- > Corrosion resistant, with a very good mechanical resistance.
- > Choosing stainless steel not only guarantees the quality of the structure, it also gives it the aesthetics of a work of art.
- > Characteristics meet the strictest technical requirements: long range, lighter structures and seismic performance.
- > Can be used bare, even in very aggressive environments such as seashores or industrial areas.
- Young's modulus on density allows us to balance between lightness and rigidity and thus create fine and sleek structures.
- > The benefits associated with the use of this material are also often the source of savings, which ultimately puts the cost into perspective.



### 7. INTERIOR DECORATION

Stainless steel applications are numerous, the only limitation is the imagination of the user.

- > Interior decoration: elevators, metal furniture, store fixtures, decorative stands, bars, bank counters, entrances, collective kitchen furniture, etc.
- > Urban furniture, signs, monuments, etc.
- > Industrial screen printing, signs, corporate logos, etc.















### Aperam Stainless Europe

A tailor-made stainless steel solution for every customer

Ensuring proximity and availability to meet your needs is one of our commitments.

Through our European network of service centres and sales offices, you benefit from both the might of a large organisation and the responsiveness of a local unit matched to organisations of all scales.

Ready to start working on a tailor-made solution backed by an industry-leading commitment to long-term support? Contact one of our experts today to confirm your choice of stainless steel.

#### DISCLAIMER

"This document is for information only and seeks to provide professionals with the best possible information to enable them to make appropriate choices. However, product range development may render all or part of this document obsolete. Our company's sales and technical personnel are at your disposal to provide further information. This document does not constitute a recommendation or a contractual commitment on the part of our company.

Aperam reserves the right to change its products at any time in light of technical advances. Product selection is the responsibility of the specifiers, designers and builders, who are solely responsible for rendering the finished unit suitable for the use for which it is intended. It is the customer's sole responsibility to ensure that the product is suitable for the use for which it is intended; unless specifically agreed to the contrary, Aperam is unable to provide any guarantee in this respect.

Any technical assistance provided by Aperam corresponds to the duty to provide advice and information that is incumbent upon any manufacturer mindful of the correct use of its products but shall not render Aperam co-designer or co-constructor of the unit in which its products are used".



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### **Coloured products** and special finishes

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Back cover: Résidence Hôtelière du Rail, Montparnasse Bahnhof, Paris - France - aasb\_agence d'architecture suzelbrout - Executed using grade 304L, with Uginox Mat finish



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