

Stainless steels for mildly corrosive environments

Outokumpu Moda range

outokumpu
high performance stainless steel



outokumpu.com/moda

We believe in a world that lasts forever

Outokumpu is a global leader in the advanced materials business, creating stainless steels that are efficient, long lasting, and recyclable. A strong customer focus, sustainability, and technical excellence are at the heart of everything we do.

As an open and approachable company, our customers rely on our advice to help them select products that will deliver the best long-term performance for their needs.

With over a century of innovation behind us and some of the best minds in the business, we continue to develop pioneering materials to meet the demands of tomorrow.

The durability of stainless steel means that it is not only the best, but also the most economically sustainable choice for a wide range of applications. All of our products are made from an average of 85% recycled material and are fully recyclable at the end of their lifecycles.

Together with our customers and partners, we are building a world that lasts forever.

Stay up to date on our latest innovations, follow market trends, and get inspired by success stories – subscribe to our magazines and newsletters
outokumpu.com/newsletter



The inside view

For mildly corrosive environments.

Outokumpu's legacy of innovation and consistent quality means we have the right product for every application. By grouping our products into ranges based on performance rather than stainless steel family we aim to make choosing the best product for your application easier.

Moda range products are designed for applications in mildly corrosive environments, with a Pitting Resistance Equivalent (PRE) value of up to 17. This range contains our key product Moda 430/4016 as well as several alternatives including low-chromium options.

“ Outokumpu has decades of experience in creating and developing the products in the Moda range.

The Moda range is made up of ferritic stainless steels that give you good formability and attractive surface finishes. The Moda range grades are widely used in applications ranging from cutlery and appliances to elevators.

Outokumpu has decades of experience in creating and developing the products in the Moda range. We have invested a great deal of time and research refining the appearance and corrosion resistance of our materials with industry-leading surface finishes.

Moda range products are readily available around the globe and are delivered from mills that are well known for their quality and on-time delivery accuracy. You can depend on Outokumpu stainless steels to reliably and consistently meet the specifications that your application demands.



Javier Avila, Outokumpu

Our customers also rely on us to deliver the best material selection advice, and we can often find more cost-effective solutions that help you to avoid over-specifying.

Contact us by outokumpu.com/contacts to find out which of our products is right for your next project.



The Pitting Resistance Equivalent (PRE) number can be used to roughly compare the resistance of different stainless steels to pitting corrosion. It takes into account the effect of the most important alloying elements.

Choosing the right product

Choosing the right stainless steel for an application is key to ensuring both the cost effectiveness and success of your project. Take a look at the individual Moda range products – and the applications they are best suited for – to get an idea of your options.

Key product

Moda 430/4016

A classic 16% chromium ferritic stainless steel used in mildly corrosive environments.

Typical applications

- Kitchen equipment
- Household appliances
- Sinks
- Indoor cladding
- Elevators
- Coins

Product forms

C, H, B, R, S

Product forms



C

Cold rolled
coil and sheet



H

Hot rolled
coil and sheet



P

Quarto plate



B

Bar



R

Wire rod



S

Semifinished
(bloom, billet, ingot & slab)



T

Pipe

Moda range applications

Common applications include:

- Washing machines
- Dishwashers
- Sinks
- Counter tops
- Cooker hoods
- Refrigerators
- Tableware and cutlery
- Ice machines
- Indoor cladding
- Grills
- Elevators
- Bus chassis
- Fins for heat exchangers
- Automotive exhaust systems
- Railroad cars
- Oil process equipment (mildly corrosive environments)
- Coins

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If your application requires more corrosion resistance, try a product from the Outokumpu Core range.

Alternatives

Outokumpu name	Typical applications	Product forms
Moda 4510 A titanium-stabilized 16% chromium ferritic steel with improved corrosion resistance, formability, and weldability compared to Moda 430/4016.	• Automotive exhaust systems • Sugar industry equipment • Household appliances	C, H, S
Moda 439/4510 A titanium-stabilized 17% chromium ferritic steel with improved corrosion resistance, formability, and weldability compared to Moda 430/4016.	• Automotive exhaust systems • Sugar industry equipment • Household appliances	C, H, S
Moda 4511 A niobium-stabilized 16% chromium ferritic steel with improved formability and weldability compared to Moda 430/4016.	• Food processing industry equipment • Welded ferritic parts	C, H, S
Moda 430Ti/4520 An alternative to Moda 430/4016 with better formability and weldability for stamping, drawability applications, and complex shapes.	• Counter tops • Flue induction connectors • Automotive applications	C, H, S
Moda 4589 A 14% chromium product with a small amount of niobium for elevated strength, making it suitable for structural parts exposed to loads that demand higher yield points.	• Conveyor chains • Railroad cars	C, H, S

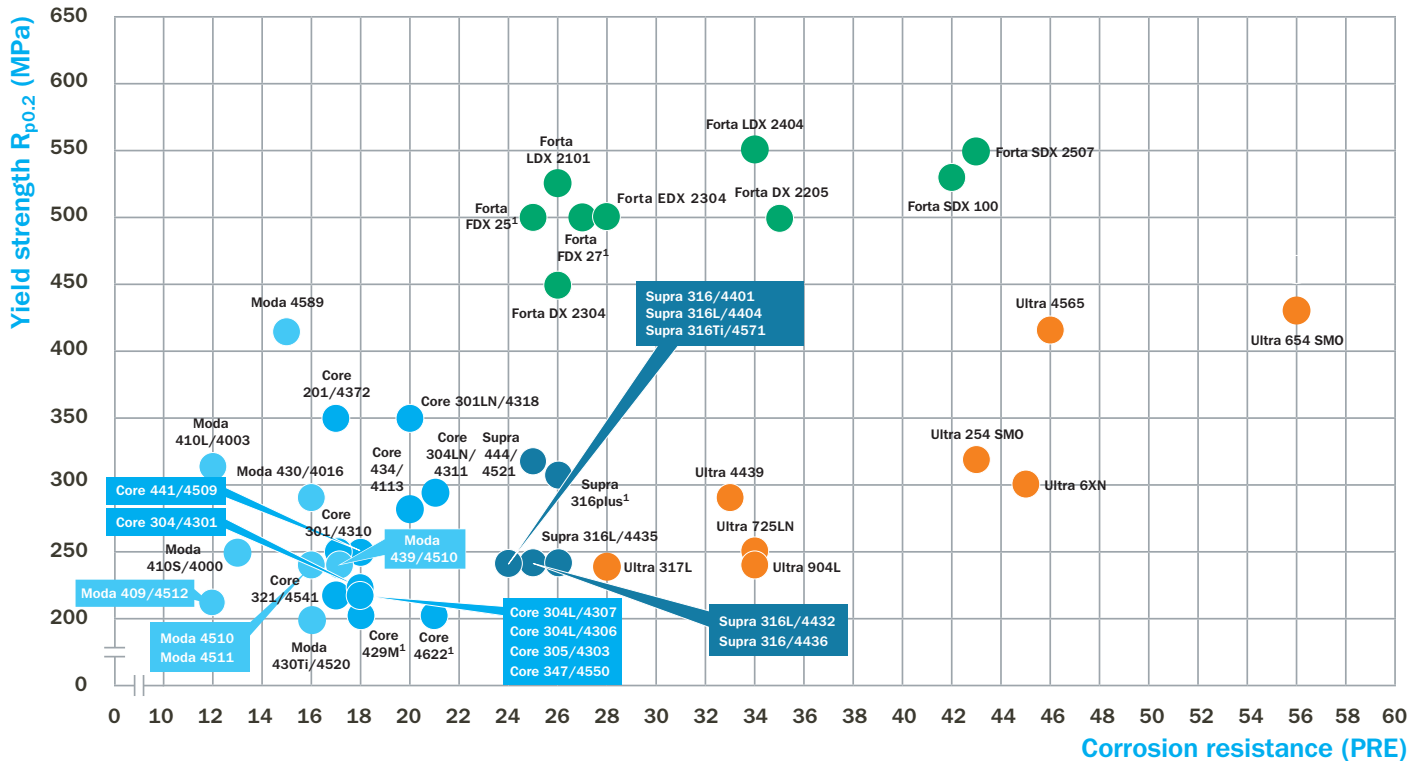
Low-chromium alternatives

Our low-chromium stainless steels offer better corrosion resistance than carbon steels in mildly corrosive environments.

Outokumpu name	Typical applications	Product forms
Moda 410L/4003 A weldable ferritic stainless steel with elevated yield strength and resistance to abrasion. Its better corrosion resistance compared to carbon steels enables lower maintenance costs and longer service life.	• Railroad and road vehicles • Shipping containers • Industrial applications • Mining conveyors	C, H, P, S
Moda 409/4512 A weldable ferritic stainless steel with good oxidation resistance in dry air. This product is also available as low-carbon Moda 409L.	• Automotive applications • Industrial exhaust systems	C, H, S
Moda 410S/4000 A 13% chromium general-purpose stainless steel that is used widely where corrosion is not severe. When supplied in the age hardened condition Moda 410S/4000 can be used where moderate corrosion resistance and higher strength is required, while retaining its machinability.	• Bearings • Bushings • Dies • Fasteners • Pump shafts • Valves and valve components	C, H, P, S

Product performance comparison

Strength vs. corrosion resistance



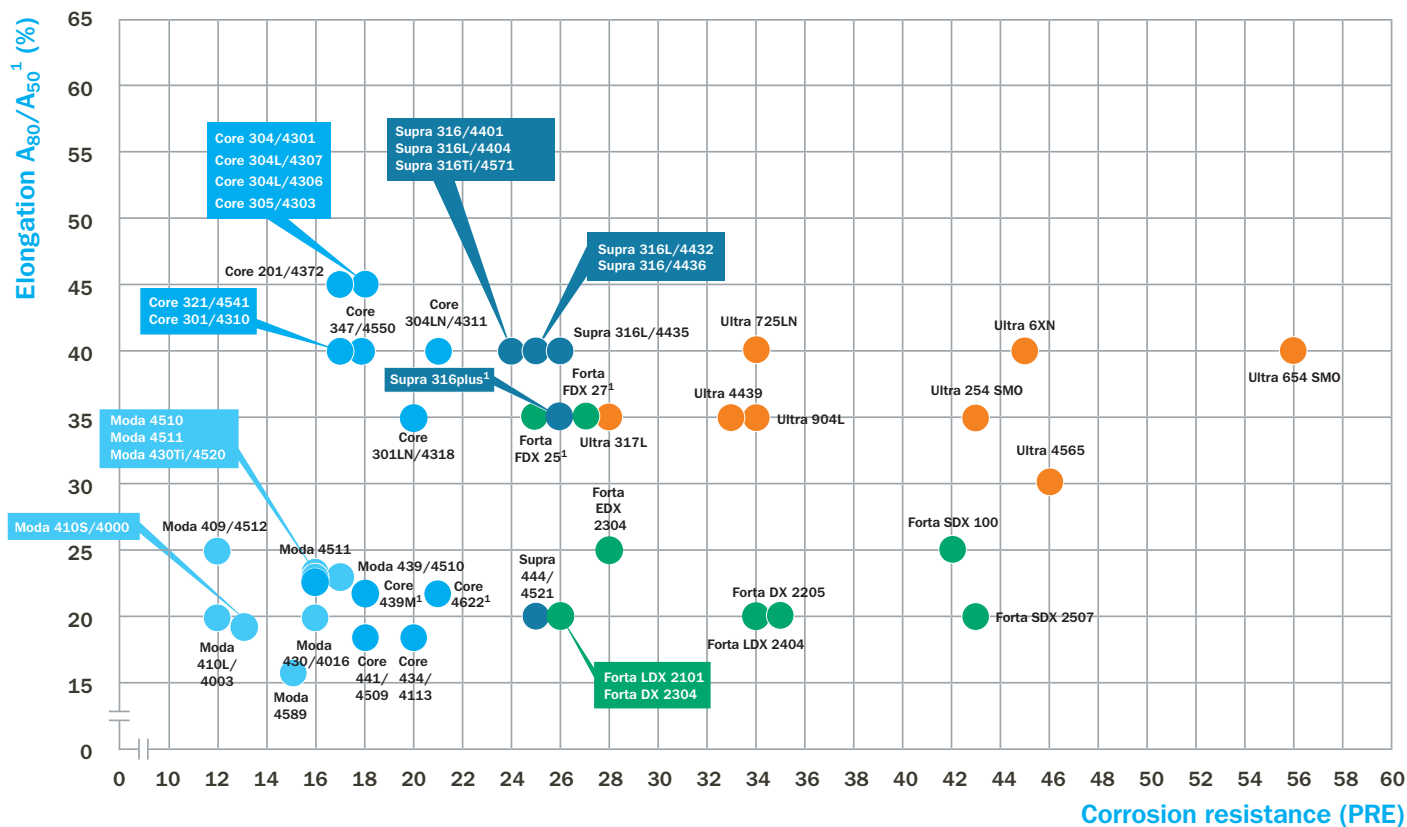
- Moda – Mildly corrosive environments
- Core – Corrosive environments
- Supra – Highly corrosive environments
- Forta – Duplex and other high strength (PRE 16 to 43)
- Ultra – Extremely corrosive environments (PRE > 27)

PRE calculation = %Cr + 3.3 x % Mo + 16 x %N

Note: PRE values shown are Outokumpu typical values. Yield strength ($R_{p0.2}$) according to EN 10088-2 minimum values for cold rolled strip. Yield strength for temper rolled products ranges from 500-2000 MPa.

For more values by product, please see steelfinder.outokumpu.com

Elongation vs. corrosion resistance



- Moda – Mildly corrosive environments
- Core – Corrosive environments
- Supra – Highly corrosive environments
- Forta – Duplex and other high strength (PRE 16 to 43)
- Ultra – Extremely corrosive environments (PRE > 27)

PRE calculation = %Cr + 3.3 x % Mo + 16 x %N

Note: PRE values shown are Outokumpu typical values. Elongation (A_{80}) according to EN 10088-2 minimum values for cold rolled strip.

For more values by product, please see steelfinder.outokumpu.com



Learn more at outokumpu.com/moda

Product properties

Moda range														
				Mildly corrosive environments										
Steel designations				Performance					Typical chemical composition, % by mass					
Outokumpu name	EN	ASTM		PRE	A ₈₀ %	R _{p0.2} MPa	R _m MPa	Grade family	C	Cr	Ni	Mo	N	Others
		Type	UNS											
Moda 430/4016	1.4016	430	S43000	16	20	280	430–600	F	0.05	16.2	–	–	–	–
Alternatives														
Moda 4510	1.4510	–	–	16	23	240	420–600	F	0.02	16.2	–	–	–	Ti
Moda 439/4510	1.4510	439	S43035	17	23	240	420–600	F	0.02	17.1	–	–	–	Ti
Moda 4511	1.4511	–	–	16	23	240	420–600	F	0.02	16.2	–	–	–	Nb
Moda 430Ti/4520	1.4520	430Ti	–	16	24	200	380–530	F	0.02	16.2	–	–	–	Ti
Moda 4589	1.4589	–	S42035	15	16	420	550–750	F	0.05	14.0	1.7	0.3	–	Ti
Low-Cr alternatives														
Moda 410L/4003	1.4003	410L	S40977	12	20	320	450–650	F	0.02	11.5	0.5	–	–	–
Moda 409/4512	1.4512	409	–	12	25	220	380–560	F	0.02	11.5	0.2	–	–	Ti
Moda 410S/4000	1.4000	410S	S41008	13	19	250	400–600	F	0.03	12.5	–	–	–	–

Note: Values shown are EN 10088-2 minimum values for cold rolled strip for elongation (A₈₀), yield strength (R_{p0.2}) and tensile strength (R_m). Chemical compositions are Outokumpu typical values.

For specific values by product, please see steelfinder.outokumpu.com

Moda range products are available with the following surface finishes: 1, 2B, 2D, 2E, and Deco range special surfaces.

Stainless steel types

Ferritic stainless steels have good resistance to corrosion, especially stress corrosion cracking. Lower carbon and nitrogen contents, together with niobium and/or titanium stabilization, improve both weldability and toughness. Ferritic stainless steels are magnetic.

Making money with Moda 430/4016

Passing from cash register to pocket to hand and back again, dropped, and thrown – coins have to withstand a lifetime of tough treatment. They are also exposed to a variety of different, often slightly corrosive, environments such as the insides of people's pockets or wallets.

The wear and corrosion resistance of the magnetic Moda 430/4016 made it the perfect choice for coin production. Furthermore, as a nickel-free ferritic stainless steel, it is a cost-effective choice, as it is not impacted by the price volatility of nickel. Moda 430/4016 also provides exceptional surface quality as well as consistent gauge and hardness control. When combined in a bi-metallic coin with yellow metals like copper-nickel, the surface remains bright and aesthetically pleasing even in polluted environments. Copper-alloy surfaces can also help prevent the build-up and spread of pathogenic microbes.



Looking for expert help to choose the best product for your next project?
Contact us by outokumpu.com/contacts

Working towards forever.

We work with our customers and partners to create long lasting solutions for the tools of modern life and the world's most critical problems: clean energy, clean water, and efficient infrastructure. Because we believe in a world that lasts forever.

outokumpu
classic

Moda

Mildly
corrosive
environments

Core

Corrosive
environments

Supra

Highly
corrosive
environments

outokumpu
pro

Forta

Duplex
& other
high strength

Ultra

Extremely
corrosive
environments

Dura

High
hardness

Therma

High
service
temperatures

Prodec

Improved
machinability

Deco

Special
surfaces

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