outokumpu
sustainable stainless steel

Core
Corrosive environments

Core 4622

Outokumpu Core range datasheet

General characteristics and properties

Outokumpu Core 4622 (EN 1.4622) is a stabilized, nickel-free 21% chromium ferritic stainless being competitive alternative for 304L/4307 in wide range of applications.

Core 4622 offers similar corrosion resistance, better heat transfer, machinability and deep-drawability compared to 304L/4307. Core 4622 have good weldability via smaller weld distortion and buckling behavior than austenitic stainless steels. Core 4622 is almost ridging free providing easy polishing when compared to traditional ferritic stainless steels. Core 4622 have excellent resistances to chloride-induced stress-corrosion cracking. It is possible to use Core 4622 at elevated temperatures. Core 4622 is ideal for a wide range of applications such as catering, household and architectural applications, as wells as in tubular products for the automotive and process industries. Core 4622 fulfills ASTM UNS S44330.

Core 4622 has:

- **Good corrosion resistance**
  Comparable to common austenitic grades 304 (EN 1.4301) and 304L (EN 1.4307).
- **Competitive and stable price**
  Excellent cost stability compared to Ni-alloyed austenitic grades and Mo-alloyed acid proof grades.
- **Deep drawable**
  Ideal for deep drawing applications with high R-value and limiting drawing ratio (LDR).
- **Easy to polish**
  Virtually roping free for easy polishing. Improved surface properties due to low Ti content.
- **Good weldability**
  Low risk of sensitization due to stabilization. Less distortion than in austenitic grades due to higher heat transfer.
- **Good machinability**
  Lower work hardening than austenitic grades provide better machinability enabling faster machining times and longer tooling life.

Chemical composition

Table 1

Steel designations				Performance				Typical chemical composition, % by mass					
		ASTM			A [1]	$R_{p0.2}$	Grade						
Outokumpu name	EN	Type	UNS	PRE	%	MPa	family	C	Cr	Ni	Mo	N	Others
Core 4622	1.4622	–	S44330	21	22 [2]	300 [2]	F	0.02	21.0	–	–	–	Ti Nb Cu
For comparison													
Core 304/4301	1.4301	304	S30400	18	45	230	A	0.04	18.1	8.1	–	–	–
Core 304L/4307	1.4307	304L	S30403	18	45	220	A	0.02	18.1	8.1	–	–	–
Core 441/4509	1.4509	–	S43940	18	18	250	F	0.02	17.6	–	–	–	Ti Nb

Grade family: A = austenitic, F = ferritic. [1] Elongation reference varies between different standards, information referenced here denotes A_{80} – otherwise see footnote for specific grade or inquire to reference alternative standard. [2] Min. values acc. to EN 10028-7.

PRE = %Cr + 3.3 x %Mo + 16 x %N
Values for $R_{p0.2}$ yield strength and the A_{80} for elongation are according to EN 10088-2 min. values for cold rolled strip. Chemical compositions and PRE calculations are based on Outokumpu typical values.
Please see values for other product forms at **steelfinder.outokumpu.com**

Mechanical properties at room temperature according to EN 10028-7 and ASTM A240.

Table 2

Outokumpu name	Standard	Product form [1]	Yield strength	Tensile strength	Elongation	Hardness
			$R_{p0.2}$ [MPa]	R_m [MPa]	A [%]	HB30/HBW
Core 4622	Typical	C	360	470	30	162 HB30
	EN 10028-7	C	≥ 300	430–630	≥ 22 [2]	–
	ASTM A240	C, H, P	≥ 205	≥ 390	≥ 22 [3]	≤ 187 HBW
Core 304L/4307	Typical	C	290	600	53	–
	EN 10028-7	C	≥ 220	520–700	≥ 45 [2]	–
		H	≥ 200	520–700	≥ 45 [2]	–
		P	≥ 200	500–700	≥ 45 [2]	–
	ASTM A240	C, H, P	≥ 170	≥ 485	≥ 40 [3]	≤ 201 HBW

[1] Product forms: C = Cold rolled coil, H = Hot rolled coil, P = Quarto plate
[2] Thickness < 3 mm: A_{80} initial length = 80 mm. Thickness ≥ 3 mm initial length = $5.65\sqrt{S_0}$
[3] Gauge length 2 in. or 50 mm

Typical applications

High chromium content makes this grade appropriate for replacing standard austenitic grades in many applications:

- Catering and household products
- Architectural applications both indoors and outdoors
- Tubular products for automotive industry
- Process equipment such as heat exchangers

Corrosion resistance

Outokumpu produces Core 4622, PRE 21, typically with a chromium content of about 21 wt-%.

- High chromium content improves corrosion resistance, which is similar compared to some other stainless steels, like austenitic 304L (1.4307).
- Stabilization reduces sensitivity for intergranular corrosion.
- In chloride containing environments pitting and crevice corrosion is possible depending on various parameters like chloride concentration, temperature, pH value, redox potential, crevice geometry and others.
- Core 4622 is not susceptible to chloride induced stress corrosion cracking
- The best material performance is reached usually with the help of adequate design, correct post-weld treatment and regular cleaning during use (if applicable).

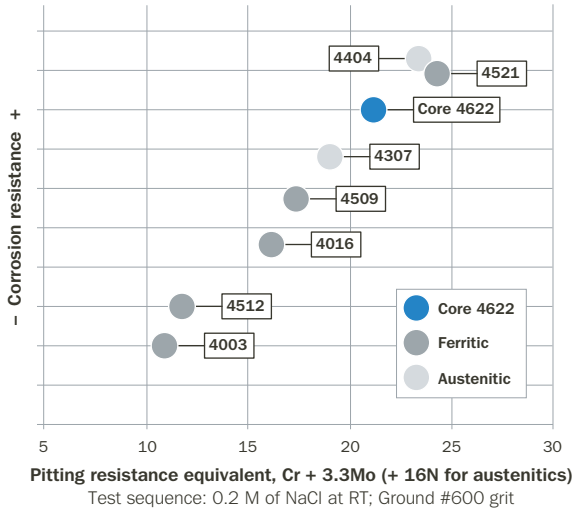

Fig. 1. Corrosion resistance vs. PRE.

Mechanical Properties

Table 2 shows the mechanical properties at room temperature for according to EN 10028-7 and ASTM A240.

Forming and machining

The grade can be formed using typical forming processes like folding, bending, drawing, etc.

- Due to modern stabilization, its R-value and LDR are higher compared to austenitic stainless steel grade 304L (1.4307) and non-stabilized ferritic stainless steel. These characteristics mean excellent deep drawability.
- Grade has slightly higher proof strength than standard austenitic stainless steel grade 304L (1.4307) in combination with lower work hardening.
- Lower work hardening provides better machinability, e.g. faster machining times and longer tooling life.

Table 3 shows the typical R and LDR values.

Typical R and LDR values.

Table 3

Outokumpu name	R-value	LDR
Core 4622	2	2.3
Core 304L/4307	1.2	2.1

Welding

Conventional welding methods are applicable, austenitic 316L filler metals can be used.

- Shielding gases should be Ar/He based, mixed with maximum of 2% oxygen to improve the arc stability. Hydrogen and nitrogen additions are forbidden.
- Heat input should be minimized to reduce the grain growth in the heat-affected zone.
- Stabilization prevents sensitization in the welds.
- Adequate corrosion resistance in the welds using either mechanical descaling or pickling.

Physical properties

Crystal structure is ferritic, and therefore material is ferromagnetic as soft annealed condition.

Physical properties

Table 4

Outokumpu name	Density [kg/dm³]	Modulus of elasticity at 20 °C [GPa]	Coefficient of thermal expansion 20–100 °C [10⁻⁶/K]	Thermal conductivity at 20 °C [W/(m x K)]	Thermal capacity at 20 °C [J/(kg x K)]	Electrical resistivity at 20 °C [Ω x mm²/m]
Core 4622	7.7	220	10	21	460	0.65

Room temperature, RT.

Products

Table 5

	2B			1E			2E			2K/4N		
	1000	1250	1500	1000	1250	1500	1000	1250	1500	1000	1250	1500
Min. thickness (mm)	0.5	0.5	0.8	3	3	3	3	3	3	0.5	0.5	0.8
Max. thickness (mm)	3	3	3	5.5	5.5	5.5	4.5	4.5	4.5	3	3	3

Standards and approvals

Standards and approvals

Table 6

EN 10028-7: 2016	Flat products made of steels for pressure purposes – Part 7: Stainless steels.
PED Directive 2014/68/EU	European Pressure Equipment Directive
ASTM A240/A240M-17 (fulfills UNS S44330)	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
ASME SA-240/SA-240M (fulfills UNS S44330)	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessel and for General Applications

Extensive standardization is in progress, more information from Outokumpu.

Contacts and enquiries

Contact us

Our experts are ready to help you choose the best stainless steel product for your next project.

www.outokumpu.com/contact

Core 4622 datasheet. September, 2023.

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			outokumpu pro					
Moda	Core	Supra	Forta	Ultra	Dura	Therma	Prodec	Deco
Mildly corrosive environments	Corrosive environments	Highly corrosive environments	Duplex & other high strength	Extremely corrosive environments	High hardness	High service temperatures	Improved machinability	Special surfaces

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