J2101 – UNS S32101 – EN 1.4162

DUPLEX STAINLESS STEEL

General Characteristics:

Lean Duplex Stainless steel 2101 (UNS S32101) possesses high strength coupled with corrosion resistance comparable to austenitic grades like 316L. Being a cost-effective grade owing to low nickel and molybdenum contents, along with its superior mechanical properties and good corrosion resistance, they can be utilized in various applications thus providing durability and long-term cost efficiency.

Chemical Composition:

Table 1

UNS	EN		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Cu	%Mo	%N
S32101	1.4162	Min	-	4.00	-	-	-	1.35	21.0	0.10	0.10	0.20
		Max	0.040	6.00	0.030	0.040	1.00	1.70	22.0	0.80	0.80	0.25

Mechanical Properties:

Table 2

Mechanical properties	UTS (MPa)	YS (MPa)	%EL	Hardness
ASTM A240 – UNS S32101	650 min	450 min	30 min	290 BHN

Physical Properties:

Table 3

Density (Kg/m^3)	Modulus of Elasticity (GPa)	Poisson's Ratio	Thermal Conductivity ($W/m\ ^0C$)	Thermal Capacity ($J/Kg\ ^0C$)	Electrical Resistivity ($\mu\Omega m$)
7800	200	0.3	15	500	0.80

Products available:

Hot Rolled Plates & Coil, Cold Rolled Coil & Sheets

Applications:

Storage Tanks: Palm oil, Wine, Marble slurry, Potable and Sewage water, Ethanol, Fruit juice, Biodiesel

Infrastructure: Bridges, Sluice gates

General-purpose applications and environments:

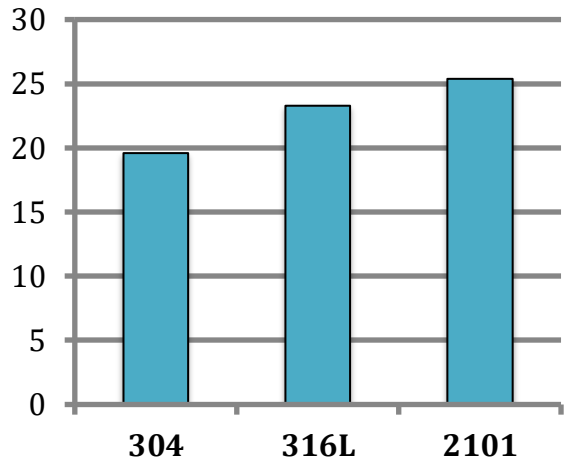
Heat Exchangers, Water Heaters, Sea-water systems, Flue-gas cleaning.

Corrosion Resistance:

Pitting Resistance Equivalent Number (PREN):

Pitting Resistance Equivalent number (PREN) illustrates the resistance to pitting corrosion and is denoted by using the formula - %Cr + 3.3*%Mo + 16*%N. Typical PREN values of both austenitic and duplex grades are mentioned in Fig: 1

Figure 1

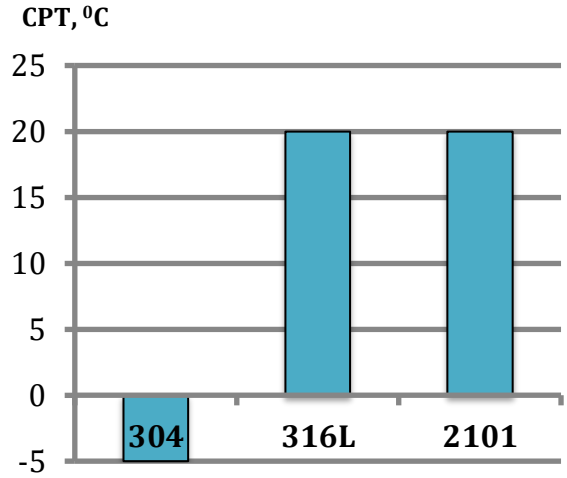


TYPICAL PREN VALUES

Critical Pitting Corrosion:

Critical Pitting corrosion is a more reliable method of differentiating duplex grades based on their resistance to corrosion. A comparative chart is presented in Fig: 2

Figure 2



Critical Pitting Corrosion:
(As per ASTM G150)

J2205 – UNS S32205/EN 1.4462

DUPLEX STAINLESS STEEL

General Characteristics:

Standard Duplex Stainless steel 2205 (UNS S32205) is the most widely used duplex stainless steel comprising almost 80% of duplex stainless steel market. This alloy provides better corrosion resistance than 316L in various environments and has an added advantage of higher yield strength thereby helping in material savings.

Chemical Composition:

UNS		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Mo	%N
S32205	Min	-	-	-	-	-	4.50	22.0	3.0	0.14
	Max	0.030	2.00	0.020	0.030	1.00	6.50	23.0	3.5	0.20
EN 1.4462	Min	-	-	-	-	-	4.50	21.0	2.5	0.10
	Max	0.030	2.00	0.015	0.035	1.00	6.50	23.0	3.5	0.22

Mechanical Properties:

Mechanical properties	UTS (MPa)	YS (MPa)	%EL	Hardness
ASTM A240 – UNS S32205	655 min	450 min	25 min	293 BHN

Mechanical properties	Product Form	Thickness max	UTS (MPa)	YS (MPa)	%EL	Impact Toughness, J
EN 1.4462 as per EN 10088	Cold Rolled	8	700-950	500 min	20 min	-
	Hot Rolled	13.5		460 min	25 min	100 (long) min
	Plate	75	640-840	460 min	25 min	

Physical Properties:

Density (Kg/m^3)	Modulus of Elasticity (GPa)	Poisson's Ratio	Thermal Conductivity ($W/m\ ^0C$)	Thermal Capacity ($J/Kg\ ^0C$)	Electrical Resistivity ($\mu\Omega m$)
7800	200	0.3	15	500	0.80

Products available:

Hot Rolled Plates

- Width – 1250
- Thickness - 5 mm to 80 mm

Hot Rolled Coils

- Width – 1250
- Thickness - 5-6 mm

Cold Rolled Coil & Sheets

- Width – 1250
- Thickness - 0.5 mm to 3 mm

Applications:

Chemical industry: Sour gas piping, Heat exchanger, tanks and vessels for chloride-containing media

Oil and Gas industry: Piping and process equipment, offshore structures

Cargo tanks in ships for transport of chemicals

Flue gas desulphurization systems, Electrostatic precipitators

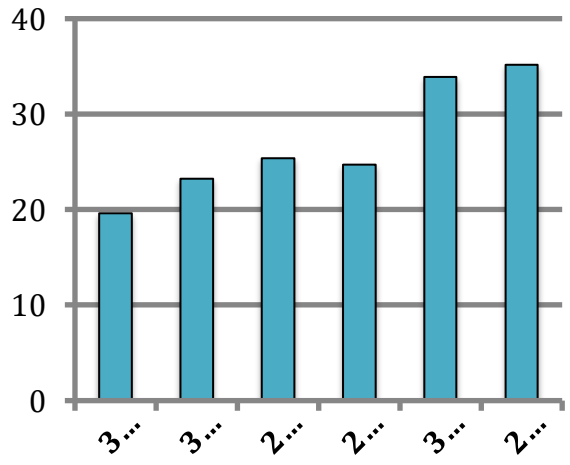
Pulp and Paper industry: Digester

Corrosion Resistance:

Pitting Resistance Equivalent Number (PREN):

Pitting Resistance Equivalent number (PREN) illustrates the resistance to pitting corrosion and is denoted by using the formula - %Cr + 3.3*%Mo + 16*%N. Typical PREN values of both austenitic and duplex grades are mentioned in Fig: 1

Figure 1

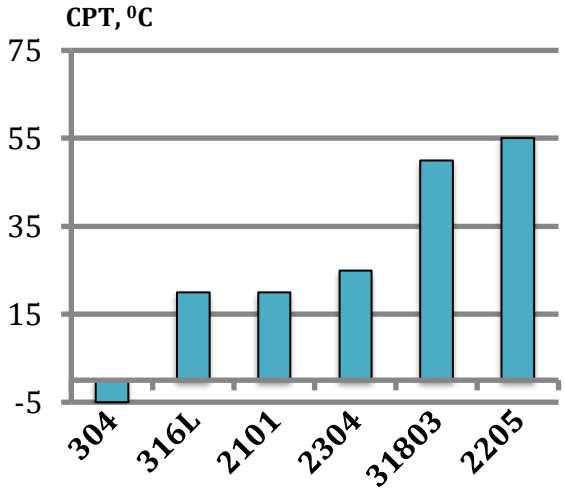


TYPICAL PREN VALUES

Critical Pitting & Crevice Corrosion:

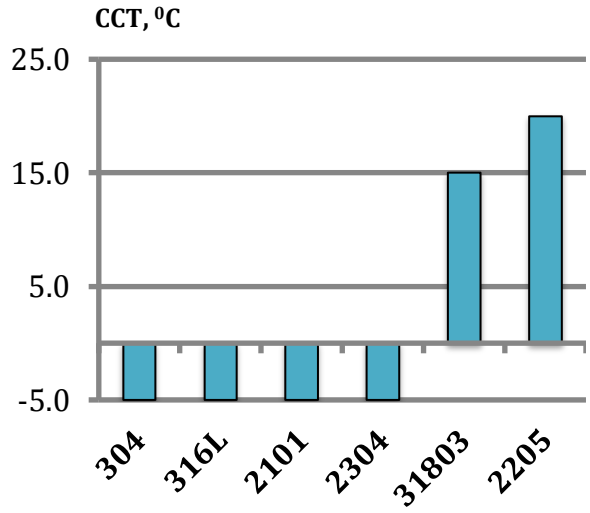
Critical Pitting & crevice corrosion are more reliable methods of differentiating duplex grades based on their resistance to corrosion. A comparative chart is presented in Fig: 2 & Fig: 3

Figure 2



Critical Pitting Corrosion:
(As per ASTM G150)

Figure 3



Critical Crevice Corrosion
(As per ASTM G48 Method F):

J2304 – UNS S32304 – EN 1.4362

DUPLEX STAINLESS STEEL

General Characteristics:

Lean Duplex Stainless steel 2304 (UNS S32304) possesses high strength coupled with corrosion resistance comparable to austenitic grades like 316L.

Chemical Composition:

Table 1

UNS		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Cu	%Mo	%N
S32304	Min	-	-	-	-	-	3.0	21.5	0.05	0.05	0.05
	Max	0.030	2.50	0.030	0.040	1.00	5.5	24.5	0.60	0.60	0.20

EN		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Cu	%Mo	%N
1.4362	Min	-	-	-	-	-	3.5	22.0	0.10	0.10	0.05
	Max	0.030	2.00	0.015	0.035	1.00	5.5	24.0	0.60	0.60	0.20

Mechanical Properties:

Table 2

Mechanical properties	UTS (MPa)	YS (MPa)	%EL	Hardness
ASTM A240 – UNS S32304	600 min	400 min	25 min	290 BHN
EN 10088 – EN 1.4362	630 – 800	400 min	25 min	-

Physical Properties:

Table 3

Density (Kg/m^3)	Modulus of Elasticity (GPa)	Poisson's Ratio	Thermal Conductivity ($W/m\ ^0C$)	Thermal Capacity ($J/Kg\ ^0C$)	Electrical Resistivity ($\mu\Omega m$)
7800	200	0.3	15	500	0.80

Products available:

Hot Rolled Plates & Coil

Applications:

Storage Tanks: Palm oil, Wine, Marble slurry, Potable and Sewage water, Ethanol, Fruit juice, Biodiesel

Infrastructure: Bridges, Sluice gates

General-purpose applications and environments

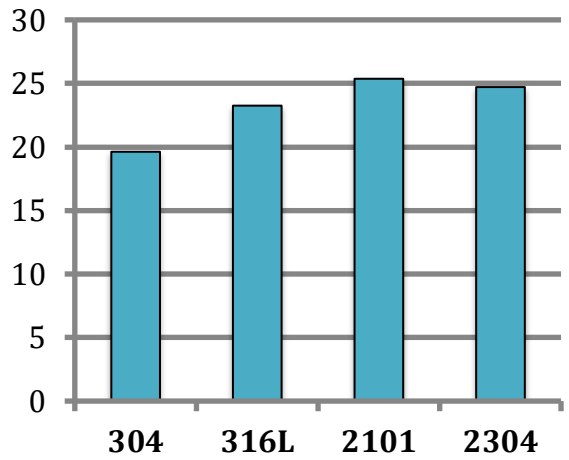
Heat Exchangers, Water Heaters, Sea-water systems, Flue-gas cleaning.

Corrosion Resistance:

Pitting Resistance Equivalent Number (PREN):

Pitting Resistance Equivalent number (PREN) illustrates the resistance to pitting corrosion and is denoted by using the formula - %Cr + 3.3*%Mo + 16*%N. Typical PREN values of both austenitic and duplex grades are mentioned in Fig: 1

Figure 1

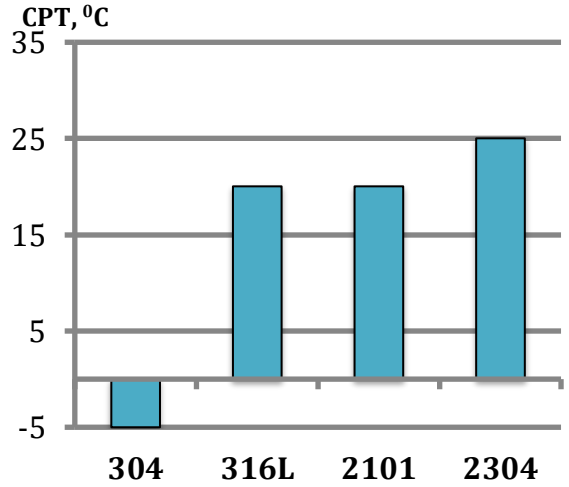


TYPICAL PREN VALUES

Critical Pitting Corrosion:

Critical Pitting corrosion is a more reliable method of differentiating duplex grades based on their resistance to corrosion. A comparative chart is presented in Fig: 2

Figure 2



Critical Pitting Corrosion:
(As per ASTM G150)

J31803 – UNS S31803 - EN 1.4462

DUPLEX STAINLESS STEEL

General Characteristics:

Standard Duplex Stainless steel 31803 (UNS S31803) along with UNS S32205 is the most widely used duplex stainless steel comprising almost 80% of duplex stainless steel market. With 0.5% less Molybdenum than UNS S32205, this alloy provides good corrosion resistance than 316L in various environments and has an added advantage of higher yield strength thereby helping in material savings.

Chemical Composition:

UNS		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Mo	%N
S31803	Min	-	-	-	-	-	4.50	21.0	2.5	0.08
	Max	0.030	2.00	0.020	0.030	1.00	6.50	23.0	3.5	0.20

EN		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Mo	%N
1.4462	Min	-	-	-	-	-	4.50	21.0	2.5	0.10
	Max	0.030	2.00	0.015	0.035	1.00	6.50	23.0	3.5	0.20

Mechanical Properties:

Mechanical properties	UTS (MPa)	YS (MPa)	%EL	Hardness
ASTM A240 – UNS S31803	620 min	450 min	25 min	293 BHN
EN 10088	640 – 840	460 min	25 min	-

Physical Properties:

Density (Kg/m^3)	Modulus of Elasticity (GPa)	Poisson's Ratio	Thermal Conductivity ($W/m\ ^0C$)	Thermal Capacity ($J/Kg\ ^0C$)	Electrical Resistivity ($\mu\Omega m$)
7800	200	0.3	15	500	0.80

Products available:

Hot Rolled Plates & Coil, Cold Rolled Coil & Sheets

Applications:

Chemical industry: Sour gas piping, Heat exchanger, tanks and vessels for chloride-containing media

Oil and Gas industry: Piping and process equipment, offshore structures

Cargo tanks in ships for transport of chemicals

Flue gas desulphurization systems, Electrostatic precipitators

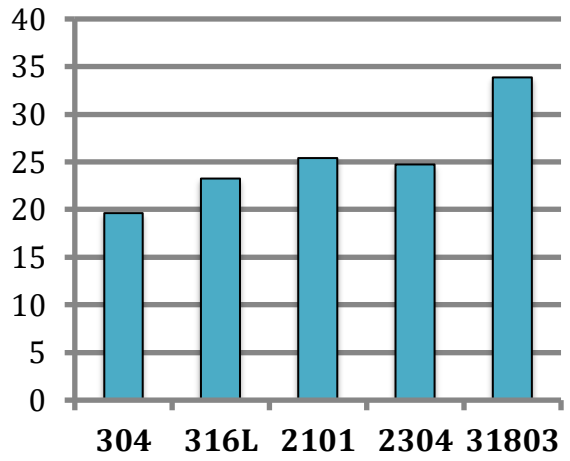
Pulp and Paper industry: Digester

Corrosion Resistance:

Pitting Resistance Equivalent Number (PREN):

Pitting Resistance Equivalent number (PREN) illustrates the resistance to pitting corrosion and is denoted by using the formula - %Cr + 3.3*%Mo + 16*%N. Typical PREN values of both austenitic and duplex grades are mentioned in Fig: 1

Figure 1

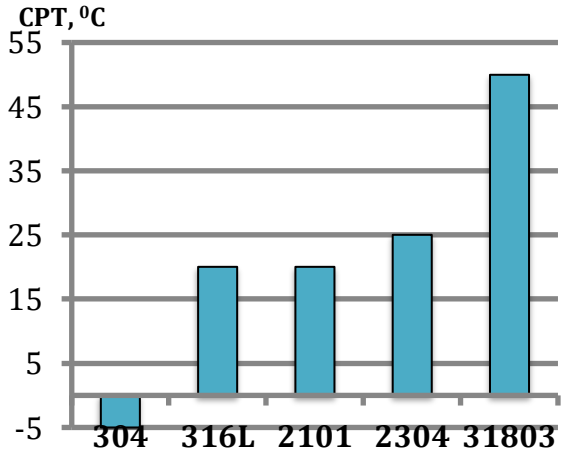


TYPICAL PREN VALUES

Critical Pitting & Crevice Corrosion:

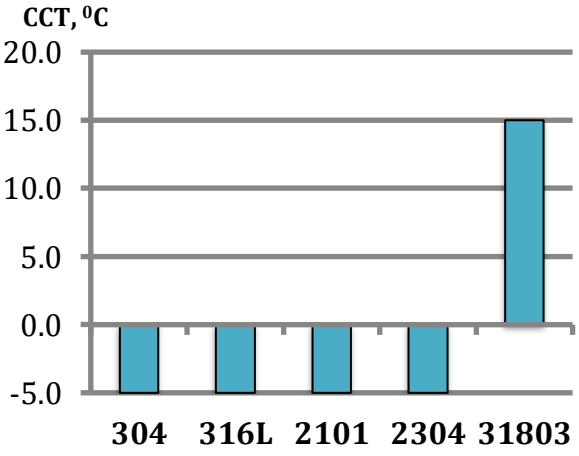
Critical Pitting & crevice corrosion are more reliable methods of differentiating duplex grades based on their resistance to corrosion. A comparative chart is presented in Fig: 2 & Fig: 3

Figure 2



Critical Pitting Corrosion:
(As per ASTM G150)

Figure 3



Critical Crevice Corrosion
(As per ASTM G48 Method F):

J2507 –UNS32750 – EN 1.4410

DUPLEX STAINLESS STEEL

General Characteristics:

Super Duplex Stainless Steel UNS S32750 combines high strength and excellent corrosion resistance in many environments & has found applications in chemical and process industries. Localized corrosion resistance of super-duplex stainless steel is close to what is achieved with 6% Mo super-austenitic grades.

Chemical Composition:

Table 1

UNS		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Cu	%Mo	%N
S32750	Min	-	-	-	-	-	6.0	24.0	-	3.0	0.24
	Max	0.030	1.20	0.020	0.035	0.80	8.0	26.0	0.50	5.0	0.32

EN		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Mo	%N
1.4410	Min	-	-	-	-	-	6.0	24.0	3.0	0.24
	Max	0.030	2.00	0.015	0.035	1.00	8.0	26.0	4.5	0.35

Mechanical Properties:

Table 2

Mechanical properties	UTS (MPa)	YS (MPa)	%EL	Hardness
ASTM A240 – UNS S32750	795 min	550 min	15 min	310 BHN

Physical Properties:

Table 3

Density (Kg/m^3)	Modulus of Elasticity (GPa)	Poisson's Ratio	Thermal Conductivity ($W/m\ ^0C$)	Thermal Capacity ($J/Kg\ ^0C$)	Electrical Resistivity ($\mu\Omega m$)
7800	200	0.3	15	500	0.80

Products available:

Hot Rolled Plates

Applications:

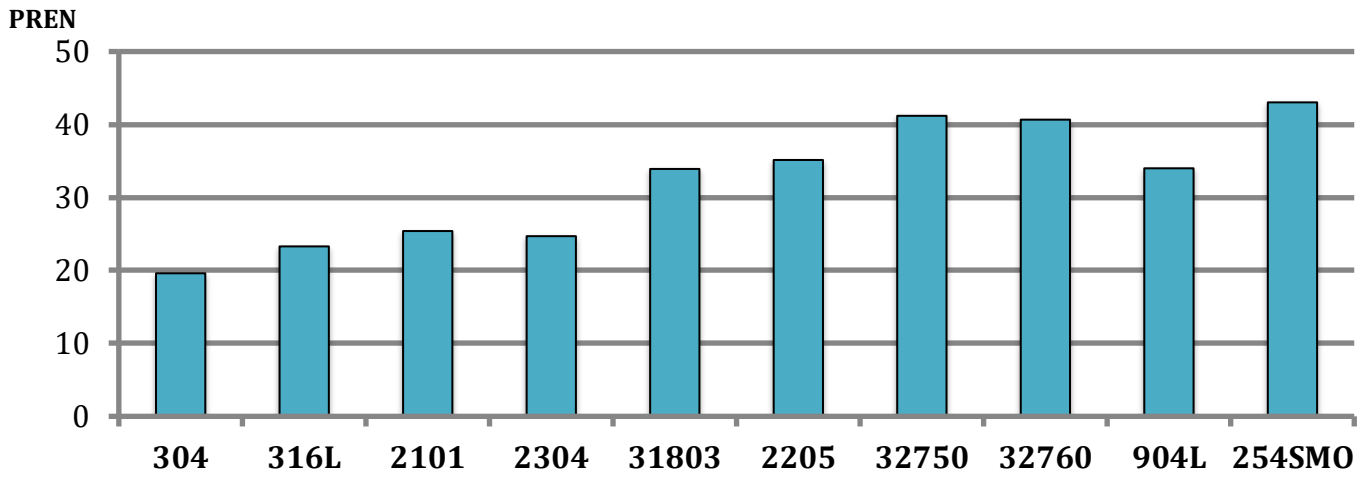
Sea Water Desalination plants and pumps, Petrochemical industries, Oil & Gas Industry, Fertilizer plant, Power Industry, Mining Extraction systems, Sewage

Corrosion Resistance:

Pitting Resistance Equivalent Number (PREN):

Pitting Resistance Equivalent number (PREN) illustrates the resistance to pitting corrosion and is denoted by using the formula - %Cr + 3.3*%Mo + 16*%N. Typical PREN values of both austenitic and duplex grades are mentioned in Fig: 1

Figure 1

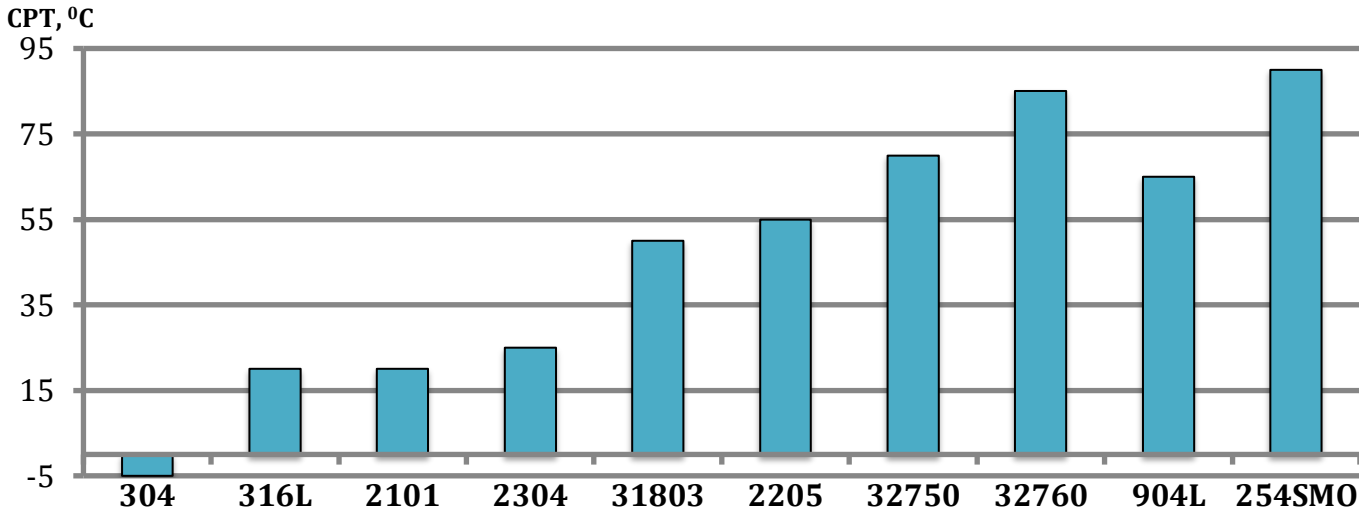


TYPICAL PREN VALUES

Critical Pitting & Crevice Corrosion:

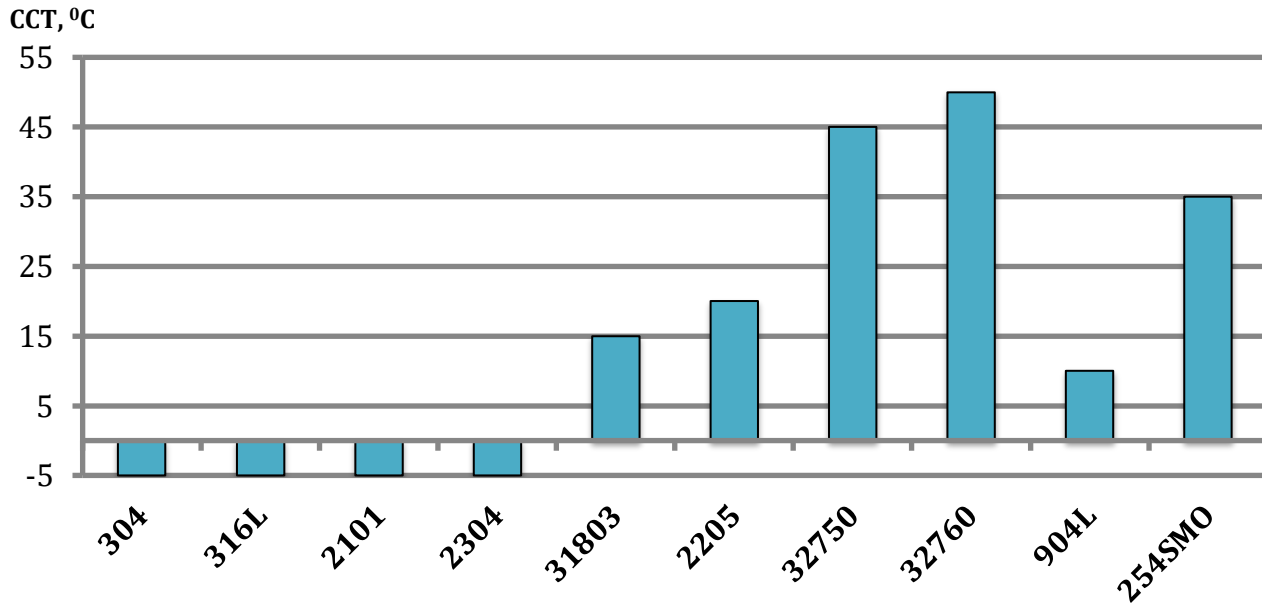
Critical Pitting & crevice corrosion are more reliable methods of differentiating duplex grades based on their resistance to corrosion. A comparative chart is presented in Fig: 2 & Fig: 3

Figure 2



Critical Pitting Corrosion: (As per ASTM G150)

Figure 3



Critical Crevice Corrosion: (As per ASTM G48 Method F)

J32760 – UNS S32760 - EN 1.4501

SUPER DUPLEX STAINLESS STEEL

General Characteristics:

Super Duplex Stainless Steel UNS S32760 combines high strength and excellent corrosion resistance in many environments & has found applications in chemical and process industries. Localized corrosion resistance of super-duplex stainless steel is close to what is achieved with 6% Mo super-austenitic grades.

Chemical Composition:

Table 1

UNS		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Cu	%Mo	%N	%W
S32760	Min	-	-	-	-	-	6.0	24.0	0.50	3.0	0.20	0.50
	Max	0.030	1.00	0.010	0.030	1.00	8.0	26.0	1.00	4.0	0.30	1.00

EN		%C	%Mn	%S	%P	%Si	%Ni	%Cr	%Cu	%Mo	%N	%W
1.4501	Min	-	-	-	-	-	6.0	24.0	0.50	3.0	0.20	0.50
	Max	0.030	1.00	0.015	0.035	1.00	8.0	26.0	1.00	4.0	0.30	1.00

Mechanical Properties:

Table 2

Mechanical properties	UTS (MPa)	YS (MPa)	%EL	Hardness
ASTM A240 – UNS S32760	750 min	550 min	25 min	310 BHN

Physical Properties:

Table 3

Density (Kg/m^3)	Modulus of Elasticity (GPa)	Poisson's Ratio	Thermal Conductivity ($W/m\ ^0C$)	Thermal Capacity ($J/Kg\ ^0C$)	Electrical Resistivity ($\mu\Omega m$)
7800	200	0.3	15	500	0.80

Products available:

Hot Rolled Plates

Applications:

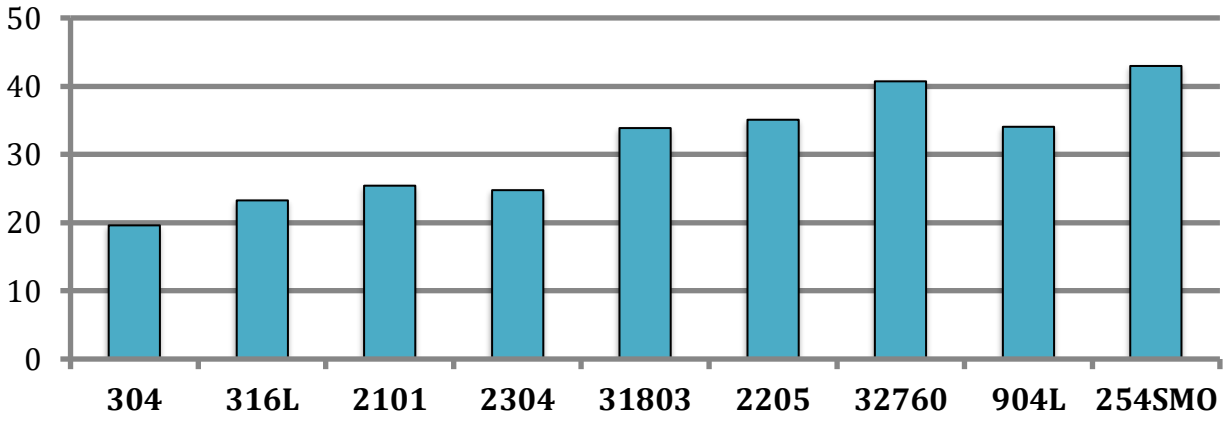
Sea Water Desalination plants and pumps, Petrochemical industries, Oil & Gas Industry, Fertilizer plant, Power Industry, Mining Extraction systems, Sewage

Corrosion Resistance:

Pitting Resistance Equivalent Number (PREN):

Pitting Resistance Equivalent number (PREN) illustrates the resistance to pitting corrosion and is denoted by using the formula - %Cr + 3.3*%Mo + 16*%N. Typical PREN values of both austenitic and duplex grades are mentioned in Fig: 1

Figure 1

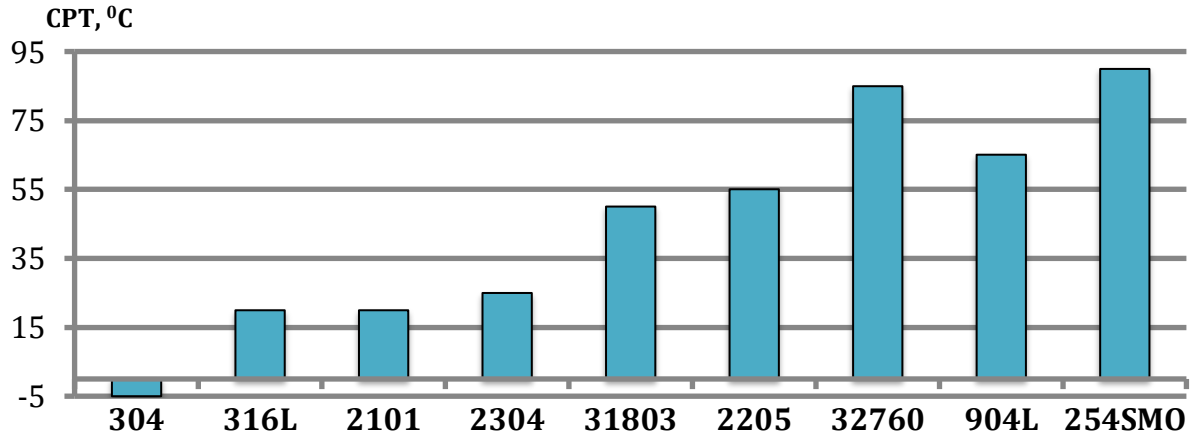


TYPICAL PREN VALUES

Critical Pitting & Crevice Corrosion:

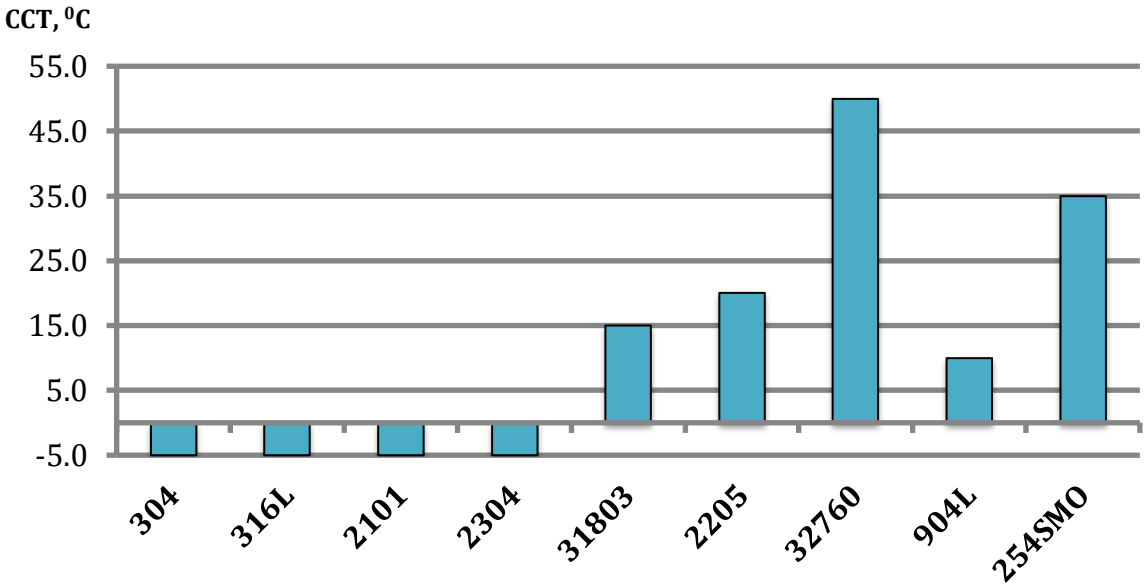
Critical Pitting & crevice corrosion are more reliable methods of differentiating duplex grades based on their resistance to corrosion. A comparative chart is presented in Fig: 2 & Fig: 3

Figure 2



Critical Pitting Corrosion: (As per ASTM G150)

Figure 3



Critical Crevice Corrosion: (As per ASTM G48 Method F)