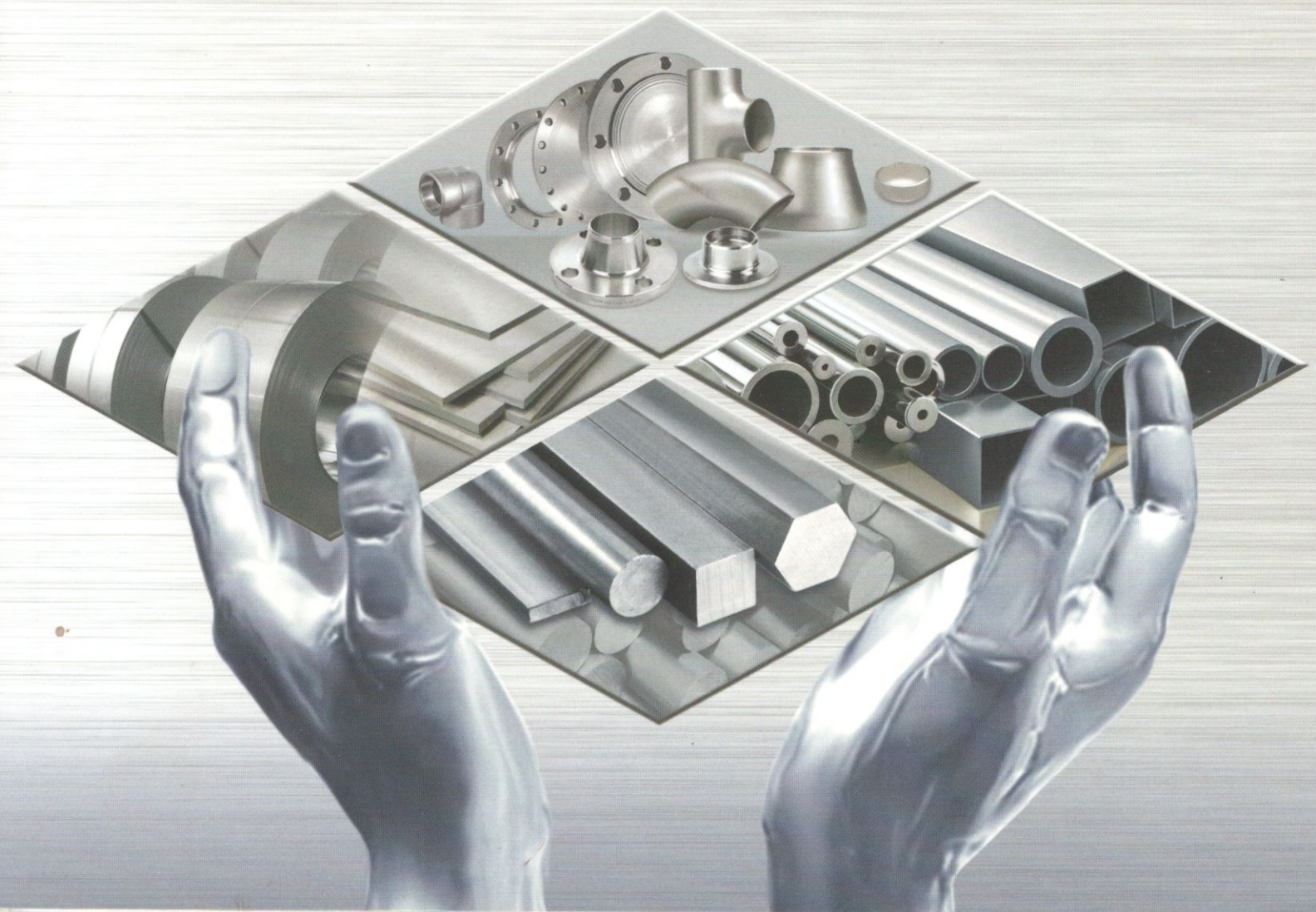




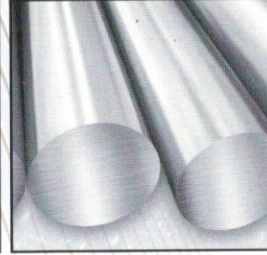
Unisteel & Engineering Co. (P) Ltd.

(An ISO 9001 : 2015 Certified Company)

Duplex steel



Reaching High



Company Profile



Since 1975, making "Stainless Steel Plate & Piping Products" has been and remains our Prime business. **Unisteel & Engineering Co. Pvt. Ltd.** is a force to reckon with in the field of Importing, Exporting, Stockholding & supplying of Stainless Steel, Duplex Steel, Carbon Steel & High Nickel Alloys in all Shapes of Sheets, Plates, Pipes, Round Bar, Pipe Fittings, Flanges, etc. We are a leading company in sales of ready-at-stock of Stainless Steel & Duplex Steel plates and Pipes.

Stocking the largest and one of the most extensive single-site stainless plate & Piping inventories in India, we are the industry heavy weight. With over 1000 Tons of Stainless Steel, Duplex Steel (2205 / 31803 / 1.4462) & Super Duplex Steel (2507) & other Alloys we can satisfy your most demanding and hard-to-find requirements.

UNISTEEL is in a position to distribute its products both on the National market as well as in International Market & specializing in supporting clients in various industries with fast track deliveries of material in any dimension, grade or certification level.

Products Overview

We carry the following stock, all of which is fully traceable in order to maintain our high quality standards.

STAINLESS STEEL :-

AISI 304, 304L, 304H, 316, 316L, 316Ti, 317L, 321, 309S, 310S, 310H, 253MA (S30815), 409M, 410S, 430.

DUPLEX STEEL :-

DUPLEX STEEL - 31803 / 1.4462 / 32205, SUPER DUPLEX 2507 / 32750 / 32760. LEAN DUPLEX STEEL 2304 & LDX 32101

ALLOY STEEL PIPE :-

ASTM, A 106 Gr.B, A335, GR.P-11, P-22, P-9, IN SIZE 1/2" To 24" Sch. 40, 80, 120, 160, XXS. With IBR MTC

BOILER & STEEL PLATES :-

ASTM A516 Gr. 70 & ASTM A387 Gr. 11 & 12 CLASS I & II. ALLOYS HARDOX, WELDOX, WELTEN, 690QL, CORTEN STEEL, SAIL HARD, S355, 16Mo3.

VIRGIN MATERIALS :-

17-4 Ph, SMO-254, 904L, MONEL, NICKEL, INCONEL, TITANIUM & HASTALLOY

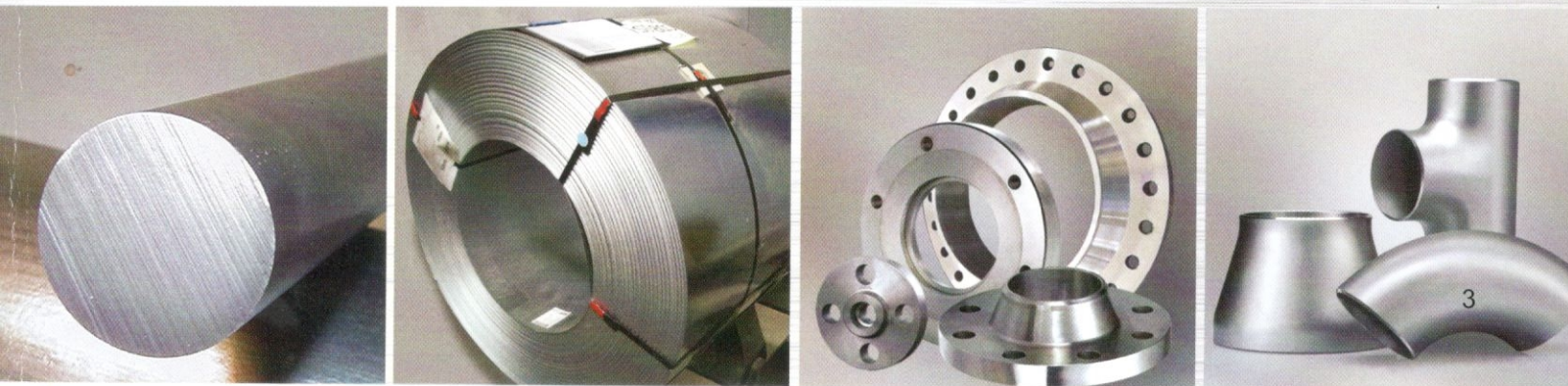
MANUFACTURERS OF :-

PIPES, PIPE FITTINGS & FLANGES - 1/2" To 48" NB

SPECIALIST IN :-

SS 310S & DUPLEX STEEL 2205 / 1.4462 / 31803 & SUPER DUPLEX 2507 SHEETS, PLATES, ROD, CIRCLE, PIPES, PIPE FITTINGS & FLANGES

SHEETS, PLATES, PIPES, TUBES, PIPE FITTINGS, BUSH, FORGED FITTINGS, INSTRUMENTATIONS FITTINGS, RODS, PROFILE CUTS, STRIPS, WIRE ROD, WIRE MESH, PERFORATED SHEETS, REFRACTORY ANCHORS, FASTNERS, CUSTOMISED PLATE FABRICATION, ETC.





STAINLESS STEEL CHEMICAL COMPOSITIONS (%)

AISI	Grades	C*	Mn*	P*	S*	Si*	Cr	Ni	Mo	Others
304	1.4301	0.08	2.00	0.045	0.030	0.75	18.0 - 20.0	8.0 - 10.5	-	-
304L	1.4306	0.03	2.00	0.045	0.030	0.75	18.0 - 20.0	8.0 - 12.0	-	-
309S	1.4828	0.08	2.00	0.045	0.030	0.75	22.0 - 24.0	12.0 - 15.0	-	-
310S	1.4845	0.08	2.00	0.045	0.030	1.50	24.0 - 26.0	19.0 - 22.0	-	-
314	1.4841	0.15	1.5	0.045	0.030	1.5-2.5	23.0 - 27.0	19.0 - 23.0	-	-
316	1.4401	0.08	2.00	0.045	0.030	0.75	16.0 - 18.0	10.0 - 14.0	Mo 2.0-3.0	-
316L	1.4404	0.03	2.00	0.045	0.030	0.75	16.0 - 18.0	10.0 - 14.0	Mo 2.0-3.0	-
316Ti	1.4571	0.08	2.00	0.045	0.030	0.75	16.0 - 18.0	10.0 - 14.0	-	Ti 5(C+N) Min, 0.70 Max
317L	1.4449	0.03	2.00	0.045	0.030	0.75	18.0 - 20.0	11.0 - 15.0	Mo 3.0-4.0,	-
321	1.4541	0.08	2.00	0.045	0.030	0.75	17.0 - 19.0	9.0 - 12.0	-	Ti 5(C+N) Min, 0.70 Max
347	1.4550	0.08	2.00	0.045	0.030	0.75	17.0 - 19.0	9.0 - 13.0	-	Ti 10 x C
330	1.4864	0.08	2.00	0.030	0.030	0.75-1.5	17.0 - 20.0	34.0 - 37.0	-	-
409M	-	0.03	1.00	0.030	0.040	1.00	10.5 - 11.75	0.5 Max	-	Ti 6(C) Min-0.75 Max
410	1.4006	0.15	1.00	0.030	0.030	1.00	11.5 -13.5	0.75	-	-
430	1.4016	0.12	1.00	0.030	0.040	1.00	16.0 -18.0		-	-
431	1.4057	0.2	1.00	0.04	0.030	1.00	15.0 -17.0	1.25 - 2.50	-	EN 57
440C	-	0.95-1.0	1.00	0.04	0.03	1.00	16.0 -18.0		-	-
446	1.4762	0.2	1.5	0.04	0.03	1.00	23.0 - 27.0	0.60 MAX	-	-
17-4PH	1.4579	0.07	1.0	0.04	0.03	1.00	15 - 17.50	3.0 - 5.0	-	Cu 3.0 - 5.0
904L	-	0.02	2.00	0.030	0.045	1.00	19.0 - 23.0	23.0 - 28.0	MO 4.0-5.0	Cu 1 - 2

* = Max.

STAINLESS STEEL- MECHANICAL PROPERTIES

Mechanical Properties of wrought Stainless Steel
(All properties minimum specified as per code)

Type	UNS Designation	Condition	Tensile Strength Mpa	0.2% Proof Strength Mpa	Elongation % in 50mm	Hardness Brinell	ASTM Specification
304	S30400	Annealed	518	205	40	201	A240
304L	S30403	Annealed	485	170	40	202	A240
309S	S30900	Annealed	515	205	40	217	A167
310S	S31000	Annealed	515	205	40	217	A167
316	S31600	Annealed	515	205	40	217	A240
316L	S31603	Annealed	485	205	40	217	A240
316Ti	S31635	Annealed	515	205	40	217	A167
317L	S31703	Annealed	515	205	40	217	A240
321	S32100	Annealed	515	205	40	217	A240
330	No8330	Annealed	480	210	30	75	B536
409M	S40900	Annealed	380	205	22	179	A176
410	S41000	Annealed	450	205	22	217	A176
430	S43000	Annealed	450	205	22	183	A176
431	S43100	Annealed	965*	-	-	-	A580
440C	S44004	Annealed	760	450	14	223	A276
446	S44600	Annealed	515	275	20	217	A176
17-4PH	S17400	H1025	1070	1000	12	331	-
904L		Annealed	490	220	35	90	-

Introduction Duplex Steel

The **Duplex** structure gives this family of stainless steel a combination of attractive properties

Strength : Duplex stainless steels are about twice as strong as regular austenitic or ferritic stainless steels.

Toughness & Ductility : Duplex Stainless Steels have significantly better ductility than Ferritic grades & inferior to Austenitic Stainless Steels but toughness of Duplex Stainless Steels is better than both Ferritic & Austenitic stainless steels.

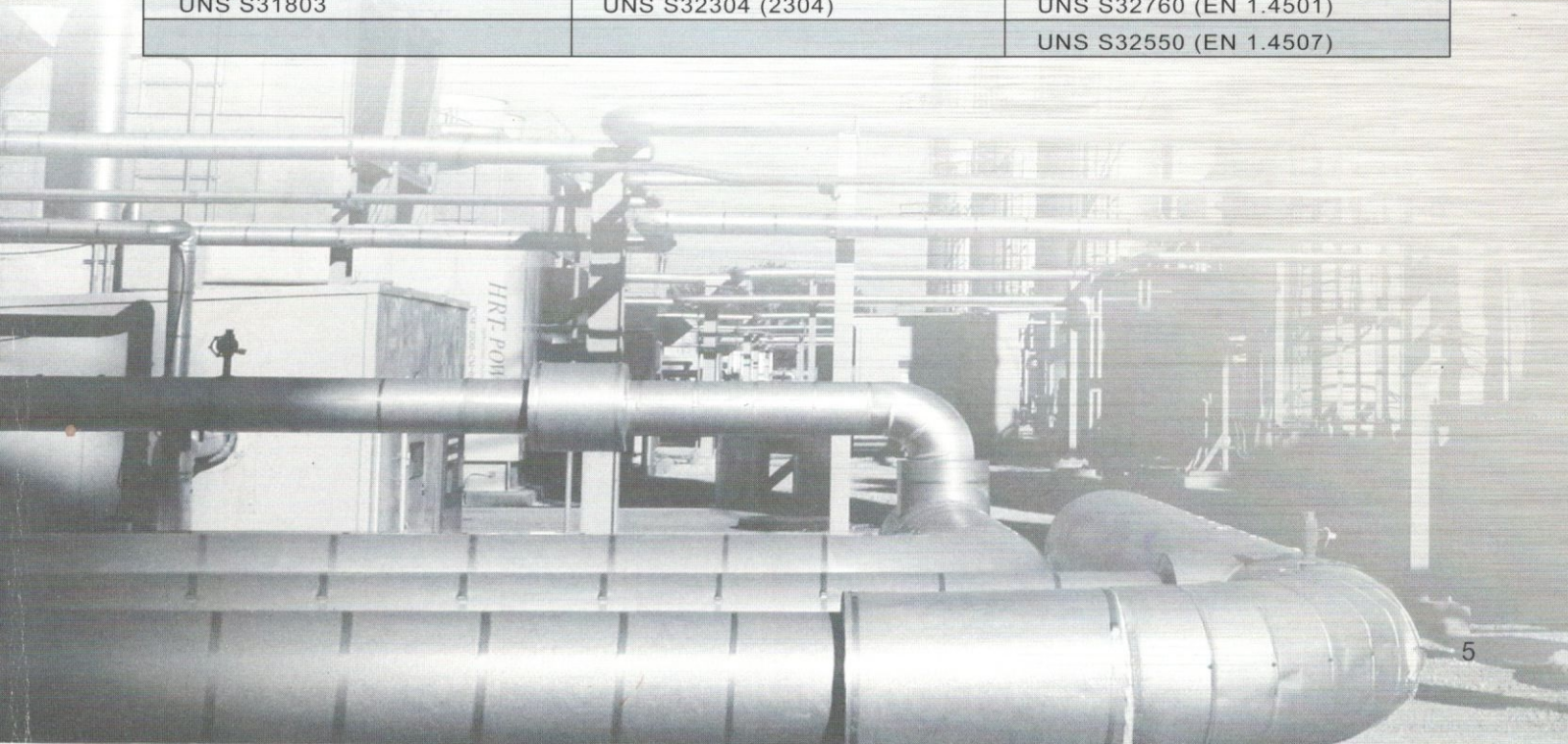
Corrosion resistance : As with all stainless steels, corrosion resistance depends mostly on the composition of the stainless steels. For chloride pitting and crevice corrosion resistance, their chromium, molybdenum and nitrogen contents are most important.

Stress corrosion cracking resistance : Duplex stainless steels show very good stress corrosion cracking (SCC) resistance, a property they have "inherited" from the ferritic side.

Cost : Duplex stainless steels have lower nickel and molybdenum contents than their austenitic counterparts of similar corrosion resistance. Due to the lower alloying content, duplex stainless steels can be lower in cost, especially in times of high alloy surcharges. Additionally, it may often be possible to reduce the section thickness of duplex stainless steels, due to its increased yield strength compared to austenitic stainless steels, The combination can lead to significant cost and weight savings compared to a solution in austenitic stainless steels.

These Grades are categorized in follows :

Regular Duplex	Lean Duplex	Super Duplex
UNS S32205 (2205, En 1.4462)	UNS S32101 (2101, EN 1.4162)	UNS S32750 (2507, EN 1.4410)
UNS S31803	UNS S32304 (2304)	UNS S32760 (EN 1.4501)
		UNS S32550 (EN 1.4507)



Regular Duplex UNS S32205 / S31803

The 2205 is the most widely used of the duplex stainless steels occupying more than 80% of the duplex stainless steel market. The 2205 alloy provides better corrosion resistance in various environments where 316L is generally used with an added advantage of its higher yield strength. All 2205 alloys are metallographically examined to ensure that the shipped product is free from presence of detrimental phases such as sigma. It is often used in form of welded pipe or tubular components. The alloy has also been applied as a formed and welded sheet product in environments where resistance to general corrosion and chloride stress corrosion cracking is important.

Grade	UNS No	C%	Cr%	Ni%	P %	Si %	S %	Mo%	N%	Mn%
31803	S31803	< 0.03	21.0-23.0	4.5-6.5	1.03 max	1 max	0.02 max	2.5-3.5	0.08-0.2	< 2.0
2205	S32205	< 0.03	22.0-23.0	4.5-6.5	0.03 max	1 max	0.02 max	3.0-3.5	0.14-0.20	< 2.0

Specification Equivalents :

UNS S31803, UNS S32205, EN 1.4462

ASTM A182, A240, A276, A789, A790 and A 815

Mechanical Properties (as per ASTM 240) :

Grade	YS (MPa)	UTS (MPa)	% Elongation	Hardness(BHN)
31803	450 min.	620 min.	25 min.	293 max.
2205	450 min.	655 min.	25 min.	293 max.

Physical Properties :

Density (Kg / M3)	Modulus of Elasticity (GPa)	Poisson's Ratio	Thermal Conductivity (W/moC)	Thermal Capacity (J/KgoC)	Electrical Resistivity
7800	200	0.3	15	500	0.80

General Characteristics :

1. PREN value 34 (Pitting Resistance Equivalent Number: %Cr +3.3*%Mo+16*%N)
2. It is an extra Low Carbon Duplex Stainless steel,
3. Its yield strength is nearly twice as that of the Austenitic Stainless Steels.
4. It has good weldability with minimal inter-granular corrosion in as welded condition.
5. It has high resistance to SCC in chloride and in hydrogen sulfide containing environments.
6. Exhibits high resistance to corrosion fatigue, pitting and crevice corrosion and erosion-corrosion.



Machinability :

- Cutting procedures with high speed steel tools are same as for AISI 316.
- With carbide tipped tools, the cutting speeds should be 40% less than for AISI 316 in roughing operations and 20% less for finish machining.

Fabricability :

- Nearly twice the force is required to initiate plastic deformation compared to that required for AISI 304L and 316L.
- Plastic deformation proceeds as easily as in Austenitic stainless steel beyond yield strength.
- It can be cold bent to 25% deformation without requiring subsequent heat treatment.
- Bending should be followed by annealing if the service conditions are prone to SCC.
- Hot bending maybe carried out in the range 950-1100 deg C and should be followed by quench annealing.
- Normal expanding methods can be used while expanding its tubes, but higher initial force is required and it should be completed in a single operation.

Weldability :

- It is welded easily by Manual Metal Arc Welding (MMAW) using covered electrode, (GTAW), Gas Metal Arc Welding (GMAW).
- Heat input should be in the range of 0.5-2.5kJ/mm
- Interpass temperature should be held to 150 deg C max.
- Preheat or postweld heat treatment is normally not required.
- Typical Filler metals are overalloyed with nickel like E2209.
- Welding with carbon steels, other stainless steels and nickel alloys is readily achieved.

Corrosion Resistance :

- Has better general corrosion resistance as compared to AISI 316L and 317L
- Welded joints easily pass inter-granular corrosion testing as per ASTM A262 Practice E-Strauss Test.
- Better resistance to pitting and crevice attack than 304 and 316 at higher temperatures and chloride contents.
- The combined high strength, hardness and corrosion resistance provide 2205 with superior corrosion fatigue and erosion / corrosion resistance.

Application :

- Chemical Industries Pumps, fans, centrifuges, sulphur melting coils,
- Chemical tanks
- Pulp & Paper Industries
- Digester in sulphate and sulfite plants, blow tanks, blow lines
- Petrochemical Industries
- Power Generation Industries
- Oil & Gas Industries
- Desalination
- Architecture and Construction
- Food Processing Equipment
- Biofuels plant
- Cargo tanks for ships and trucks

Super Duplex

UNS S32750 / 32760

Super Duplex Stainless steels, which combine high strength and excellent corrosion resistance in many environments, have found applications in chemical and process industries. Pulp mills, offshore systems, flue gas desulphurization units. Localized corrosion resistance of Super-Duplex Steels is close to what is achieved with 6% Mo Super-Austenitic grades.

UNS	C%	Cr%	Ni%	Mo%	N%	Mn%	Cu%	W	S	Si
S32750	< 0.03	24.0-26.0	6.0-8.0	3.0-5.0	0.24-0.32	< 1.20	< 0.5	-	-	-
S32760	< 0.03	24.0-26.0	6.0-8.0	3.0-4.0	0.20-0.30	< 1.00	0.5-1.0	0.5-1.0	-	-
S32550	< 0.04	24-27	4.5-6.5	2.9-3.9	0.10-0.25	< 1.5	1.5-2.5	-	0.03	1.60

Specification Equivalents :

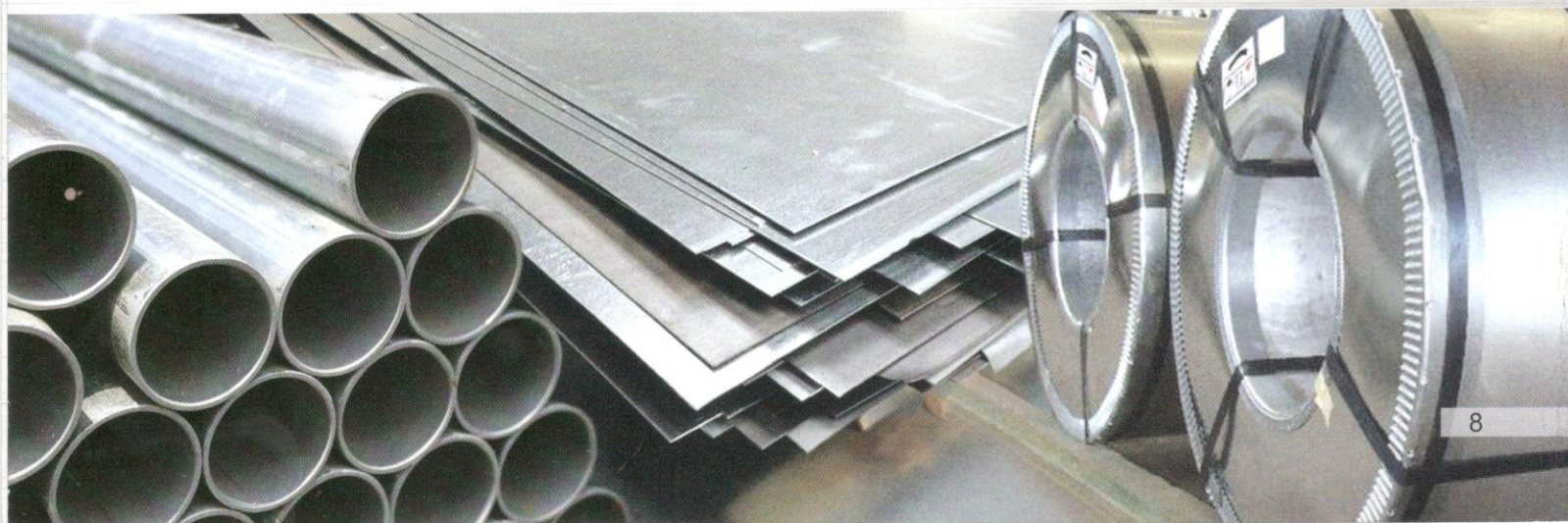
- UNS: S32750, EN 1.4410
- UNS: S32760, EN 1.4501
- ASTM: A240, A480, A789, A790

Mechanical Properties (as per ASTM 240)

Grade	YS (MPa)	UTS (MPa)	% Elongation	Hardness(BHN)
UNS S32750	550 min.	795 min.	15 min.	310 max.
UNS S32760	550 min.	750 min.	25 min.	270 max.

General Characteristics :

- Super Duplex stainless steels exhibit PREN value higher than 40.
- Combines most desirable characteristics of both super-ferritic and Super-Austenitic steel.
- Has excellent resistance to chloride SCC, pitting, crevice and general corrosion and carbide related inter-granular corrosion.
- Possesses high strength & impact strength.
- Has high thermal conductivity and a lower coefficient of thermal expansion compared to Super Austenitic steels.



Fabricability :

- It should be hot worked in the range of 1250-1000 deg C, followed by a solution annealing at 1100 deg C and rapid quench.
- It can be cold formed using methods similar to those commonly used for Stainless Steel. The primary difference is that the high yield strength makes it necessary to have higher forming forces, increased radius of bending, and increased allowance for spring back.
- Deep drawing, stretch forming and similar processes are difficult to perform.

Weldability :

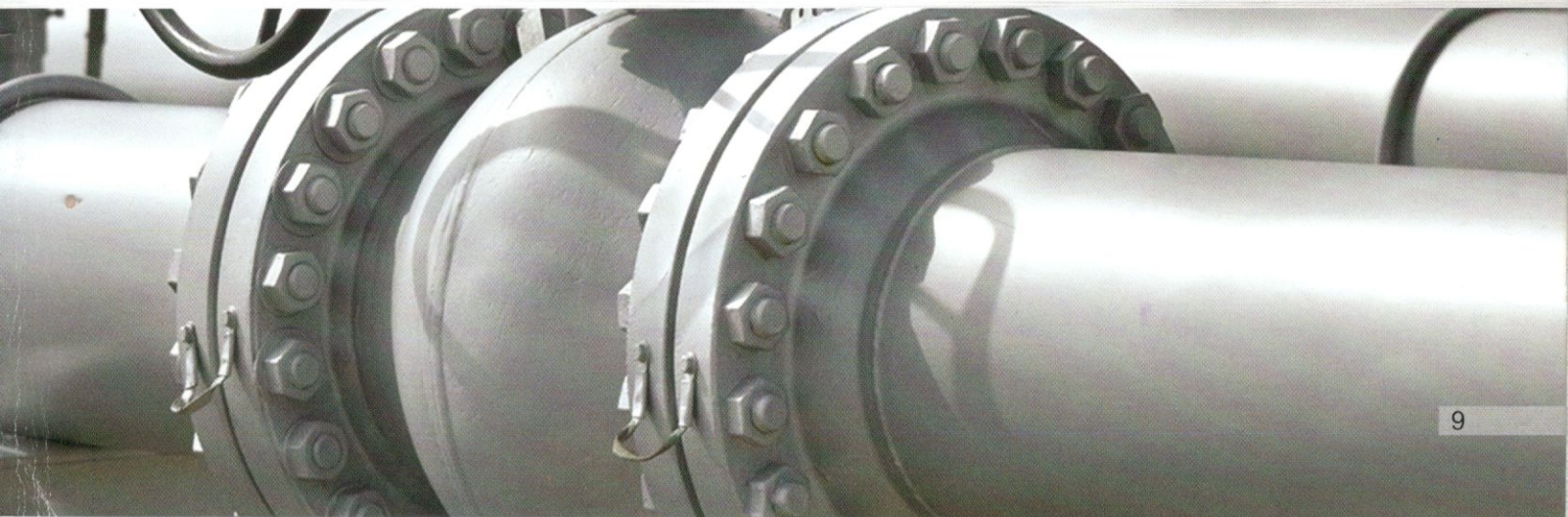
- It possesses good weldability and can be welded to itself and other materials by Shielded Metal Arc Welding (SMAW), Gas Tungsten Arc Welding (GTAW), Plasma Arc Welding (PAW) or Submerged Arc Welding (SAW).
- Surfaces must be clean before welding.
- Preheating is not necessary, except to prevent condensation on cold metal.
- The recommended heat input should be nearly about 0.3-1.5KJ/mm
- The interpass temperature should not exceed 150 deg C.
- The root should be shielded with commercial Ar or 90%N₂ / 10%H₂ purging gas for maximum corrosion resistance.

Corrosion Resistance :

- It is highly resistant to carbide related inter-granular corrosion due to its low carbon content which lowers the risk of carbide precipitation at the grain boundaries during heat treatment. Its critical pitting temperature (CPT) is superior to that of 904L.
- It has excellent resistance to crevice corrosion and SCC,
- Extremely resistant to uniform corrosion by organic acids such as formic and acetic acid and also to inorganic acids, especially those containing chlorides.
- Excellent corrosion resistance against highly corrosive acids like Sulphuric, Nitric, Phosphoric acids.

Application :

- Oil and gas industry.
- Petrochemical industries (polymerization reactor cycle pumps and pipework)
- Offshore platforms (heat exchangers, process and service water systems, fire-fighting systems, and injection and ballast water systems)
- Chemical process industries (heat exchangers and vessels)
- Desalination plants (high pressure RO-plant and seawater piping)
- Fertilizers (Recirculation tanks, sedimentation tanks, phosphate reactor recirculation pumps)
- Power industry FGD systems
- Utility & industrial scrubber systems (absorber towers, ducting, piping)
- Mining/ Extraction (hot slurry pipe work, acid leach mining)
- Sewage (critically important pipelines.)
- Engineering applications (pressure vessels,)





Lean **Duplex** UNS S32101

Lean duplex stainless steels possess high strength coupled with corrosion resistance as compared to Austenitic grades like 316L. This grade has stable cost owing to low nickel and molybdenum contents. This can easily substitute standard austenitic grades like 304, 304L and even 316L in most environments.

Chemistry :

UNS	EN	C%	Cr%	Ni%	Mo%	N%	Mn%	Cu%
S32101	1.4162	< 0.04	21.0-22.0	1.35-1.7	0.1-0.8	0.2-0.25	4.0-6.0	0.1-0.8

Specification Equivalents :

UNS : S32101, EN 1.4162

Mechanical properties (as per ASTM 240):

YS (MPa)	UTS (MPa)	% Elongation	Hardness (BHN)
450min	650min.	30min.	290max.

Typical values of Mechanical Properties :

YS (MPa)	UTS (MPa)	% Elongation	Hardness (BHN)
485	690	36	220

General Characteristics :

- More corrosion resistant than 304
- More price stable than 304
- 2.3x stronger than 304 & cheaper than 304