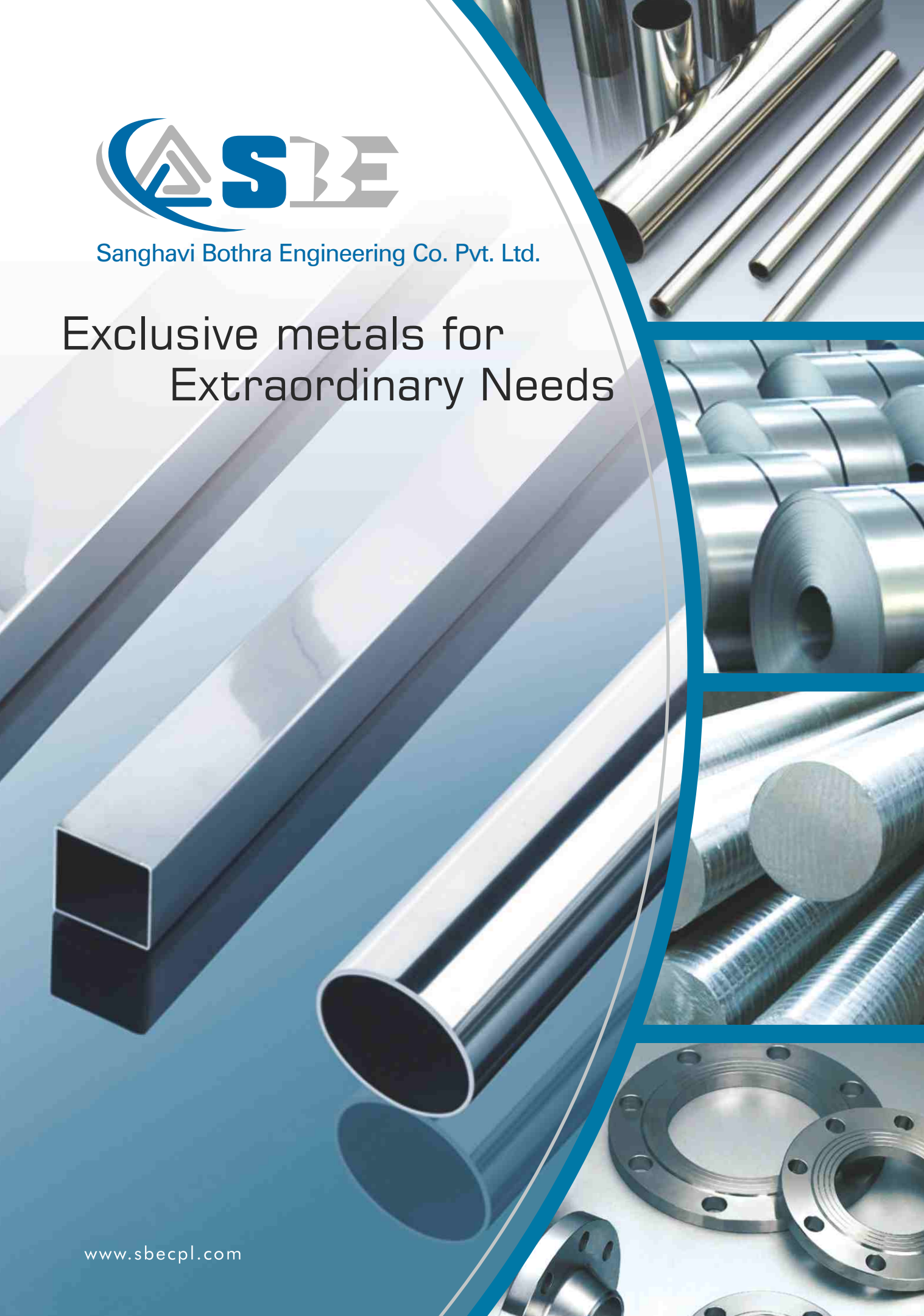




Sanghavi Bothra Engineering Co. Pvt. Ltd.

Exclusive metals for Extraordinary Needs



Welcome to a World of excellence in Industrial Supplies

Sanghavi Bothra Engineering Co. Pvt. Ltd.(SBE) was established in **1996** to meet the requirements of growing Indian and Foreign Industries. Now we are expanding our vision in to the manufacturing sector in order to meet the growing needs of our customers efficiently.

Since our inception, we have based operations on the mission of serving our customers as **“Specialist Suppliers”**. Year after year, we have used specialized skills and an extensive trade network to meet customer’s needs with precisely the right solutions. This skill has earned SBE a reputation as a trading company where customers know they can place their trust, in return receiving outstanding products and services.

As markets become increasingly global, companies in all industries are facing increasingly heated competition in India and around the world. The more rapid the pace of change, the more diverse and complex the needs of our customers become. We respond to these demands with value-added products and services, highly specialized ideas, and other forms of support. This allows us to function as each customer’s **“best partner”** in creating specific solutions for specific requirements. Well established in the global economy, we look forward to continual expansion of our customer base by adding new products to our company portfolio.

Our products Nickel Alloys, Titanium, Stainless Steel and Wear Resistant Steel & Boiler Quality Plates covers the entire spectrum of Chemical, Pharmaceutical, Oil & Gas, Fabrication, Paper & Pulp, Automobile, Cement and Power Industries.

Our company will keep working hard to meet your needs with our competitive edge. Your requirements will be highly appreciated and we are looking forward to have the possibility of proving our efficiency.

“Around here, however, we don’t look backwards for very long. We keep moving forward, opening up new doors and doing new things, because we’re curious...and curiosity keeps leading us down new paths”.

Walt Disney



Sanghavi Bothra Engineering Co. Pvt. Ltd.

Nickel Alloys

ALLOY 200
ALLOY 201
ALLOY 400
ALLOY K-500
ALLOY 600
ALLOY 601
ALLOY 625
ALLOY 800/ H /HT
ALLOY 825
ALLOY C-276
ALLOY B-2
ALLOY C-22
ALLOY 20

Duplex & Super Duplex

2205 DUPLEX
2507 SUPER DUPLEX
S 32760 SUPER DUPLEX

Stainless Steel

TP304
TP304L
TP310
TP310S
TP316
TP316TI
TP317L
TP321
TP347
TP904L
TP446

Titanium

Gr-2
Gr-5

Matt Finish Stainless Steel

Stainless Steel Matt No. 3 (Ground finish)
Stainless Steel No.4 (Brushed or Hairline finish)
Stainless Steel No. 6 (Satin finish)

Abrasion & wear-resistant plates

HB 200 Steel (SAILHARD, LLOYDS)
HB 400 Steel (HARDOX, DILLIDUR, SUMIHARD)
HB 500 Steel (HARDOX, DILLIDUR, SUMIHARD)

Boiler Quality Plates

A516 Grade 60
A516 Grade 70

Available in forms sheet, plate, pipe, tube, fittings & flanges

CORE INDUSTRIES CATERED BY SBE

- FERTILISER ● CHEMICAL ● MINING ● OFFSHORE ● OIL & GAS ● PETROCHEMICALS
- POWER GENERATION ● PHARMACEUTICALS ● PULP & PAPER ● SHIPBUILDING & MARINE
- CONSTRUCTION ● TEXTILE ● AEROSPACE





2205 DUPLEX

This widely used duplex steel combines high strength and corrosion resistance in various organic acids, inorganic acids, aggressive cooling waters and hydrous H₂S/NaCl mixtures. With a near equal mix of austenite and ferrite, they give yield strength 30% higher and tensile strengths marginally higher than comparable nitrogen-containing austenitic. It has high resistance to general corrosion and specifically to pitting and crevice corrosion. Their resistance to stress-corrosion cracking in neutral chlorides is superior to that of the austenitic.

2507 SUPER DUPLEX

UNS S32750 (2507) is a super ferritic-austenitic grade with high mechanical properties and superior corrosion resistance. Besides the ferritic-austenitic structure, 2507 has an excellent resistance to pitting and crevice corrosion and is therefore particularly

suitable for sea water applications and for process systems on off-shore platforms respectively and in all situations where there is a risk of stress corrosion. The high tensile properties are twice as much when compared to TP316L stainless steel.

CHARACTERISTICS

Duplex alloys are essentially a compromise, possessing some of the ferritic stress corrosion cracking resistance and much of the superior formability of the common austenitic stainless alloys, at a cost saving over high nickel alloys.

With its high level of chromium, Super-Duplex steel provides outstanding resistance to acids, acid chlorides, caustic solutions and other environments in the chemical/petrochemical, pulp and paper industries, often replacing 300 series stainless steel, high nickel super-austenitic steels and nickel-based alloys.

COMPOSITION OF DUPLEX STAINLESS STEEL GRADES

Material	UNS no.	Werkst. nr.	C max	Mn max	P max	S max	Si max	Cr	Ni	Mo	Other elements
2205 Duplex	S31803	1.4462	0.03	2.0	0.030	0.020	1.00	21 - 23	4.5 - 6.5	2.5 - 3.5	N = 0.08 - 0.20
2507 S. Duplex	S32750	1.4410	0.03	1.2	0.035	0.020	0.80	24 - 26	6 - 8	3 - 5	N=0.24 - 0.32 Cu=0.05 max
S. Duplex	S32760	1.4501	0.03	1.0	0.030	0.010	1.00	24 - 26	6 - 8	3 - 4	W=0.5 - 1.0 Cu=0.50 - 1.00 N=0.20-0.30

DUPLEX & SUPER DUPLEX

BENEFITS

- High strength
- High resistance to pitting, crevice corrosion resistance
- High resistance to stress corrosion cracking, corrosion fatigue and erosion
- Good sulfide stress corrosion resistance
- Low thermal expansion and higher heat conductivity than austenitic steels
- Good workability and weldability
- High energy absorption
- High thermal conductivity
- Low coefficient of thermal expansion

APPLICATIONS

- Heat exchangers, tubes and pipes for production and handling of gas and oil
- Heat exchangers and pipes in desalination plants
- Pressure vessels, pipes, tanks and heat exchangers for processing and transport of various chemicals
- Pressure vessels, tanks and pipes in process industries handling solutions containing chlorides
- Rotors, fans, shafts and press rolls where the high corrosion fatigue strength can be utilised
- Cargo tanks, piping and welding consumables for chemical tankers
- Mechanical and structural components
- Power industry FGD systems
- Pipes in process industries handling solutions containing chlorides
- High-strength, highly resistant wiring
- Paper and Pulp Industry

Stainless Steel products are, by and large, maintenance-free. There are several metallic structures across the world which could be truly called masterpieces of art. They stand testimony today to the strength, durability and versatility of stainless steel. Progress in stainless steel manufacturing techniques has led to several finishes being added to the original stainless steel like Brush, Hairline and Satin finish. Small wonder then, stainless steel is the most preferred material today by architects, builders, interior designers and food processors with unlimited applications. Matt finish stainless steel is now in demand the world over.

Stainless steel's unique combination of properties is ideal for building and constructional application and is therefore, increasingly gaining the favour of architects and engineers the world over. Stainless steel today is a practical, cost-competitive and effective solution to various problems faced by the construction industry.

Both, hard-to-access and exposed areas that suffer corrosion are ideally suited for stainless steel application. The addition of chromium to this low carbon steel, lends stainless steel its distinctive corrosion-resisting property. This and other characteristics of the metal can be further enhanced with added chromium content along with other elements such as molybdenum, nickel and nitrogen. What is best, the types of finishes now available in stainless steel contribute to its aesthetic appeal - a quality that holds good throughout the life of the material.

ADVANTAGES OF STAINLESS STEEL

Corrosion Resistance: Low Alloy grades are employed for normal atmospheric and humid conditions. Higher grades can resist acidic and alkaline environments found in process plants.

Heat Resistance: Special Alloy grades can withstand very high temperatures.

Strength: Higher tensile strength and remarkable fatigue properties in stainless steel result in cost savings - an ideal alternative to other materials.

Easy Fabrication: Stainless steel can be readily cut welded, formed and installed as easily as any other alternative material.

Easy and Low-cost Maintenance: Easily cleaned with soap and water, stainless steel regains its original finish with minimal expense and labour.

Cost Effective with High Durability: Stainless Steel retains its unique combination of properties during its entire life cycle, making it a far more economical material option for the construction industry.

PRODUCT RANGE

Stainless Steel Grades **201, 202, 304 & 316** are available in finishes given below, with PVC coating:

1. Stainless Steel Matt No. 3 (Ground finish)
2. Stainless Steel No.4 (Brushed or Hairline finish)
3. Stainless Steel No. 6 (Satin finish)

MATT FINISH STAINLESS STEEL

MATT FINISH STAINLESS STEEL

Sr. No.	Raw material finishes	Description	BSEN 10088-2 Finish	Bs Finish	ASTM A480	Typical Grit	Typical (Ra) Micro-mtrs.
1.	#1, 2D or 2b	Ground Grit	1G or 2G	3A	No.3	100-120	2.5 to 2.0 μ
2.	#1, 2D or 2B	Brushed/Hairline polished	1J	3B	-	180	1.2 to 1.0 μ
3.	2B or 2D	Dull polished	2J	4	No.4	240	0.6 μ
4.	2B or 2D, #4	Satin polished	1K or 2K	5	No.6	320	0.5 Max

CAPACITY

- Range of finish capabilities : Stainless Steel matt No.3 (Ground finish), No.4 (Brushed or Hairline Finish) & No.6 (Satin Finish)
- Finished Output (Grit 80, 100, 180, 240, 320, 400)
- Grinding Machining Width : From 400mm min to 1550mm max
- Grinding Machining Thickness : From 0.5mm min to 4mm max
- Grinding Machining Length : From 1000mm min to 5000mm max
- PVC Sheet Coating Width : From 1000mm min to 1550mm max
- PVC Coating: 80 micron thickness

APPLICATION AREAS

- Elevators
- Fabrications
- Kitchenware
- Furniture industry, interior & exterior
- Pharmaceutical, Agro & Dairy industry
- Electronic & Electrical Components



CORROSION-RESISTANT ALLOYS - NICKEL BASIS

ALLOY 200

Commercially pure nickel with good mechanical properties and excellent resistance to many corrosive media. Important characteristics are its magnetic and magneto restrictive properties, the high thermal and electrical conductivity at low gas content.

ALLOY 201

Alloy 201 is a low carbon modification of Alloy 200. This alloy has a low annealed hardness and very low work-hardening rate that is desirable for cold forming operations such as deep drawing, spinning, coining, etc. It has been used in corrosion-resistant equipment such as caustic evaporators, in spun anodes, combustion boats and laboratory crucibles, and in electronic components where its excellent fabricating characteristics provide some advantage.

ALLOY 400

Alloy 400 is especially resistant to saline and other acids in ventilated conditions. It is successfully employed in the salt winning process. Alloy 400 is especially suited for employment in sea brakeage water at high speed, where resistance against cavitations and Justify is of great importance. This alloy is extremely resistant to solvents, glass-etching agents, sulphuric and other acids and virtually to all alkalis. This grade is

not sensitive to stress corrosion cracking in oxidising media. Alloy 400 can be employed at temperatures up to 550 degrees Celsius.

ALLOY K-500

Alloy K-500 combines the excellent corrosion resistance characteristic of Alloy 400 with the added advantages of greater strength and hardness. The increased properties are obtained by adding aluminum and titanium to the nickel-copper base, and by heating under controlled conditions. The thermal processing used to effect precipitation is commonly called age hardening or ageing. Alloy K-500 retains its strength up to a temperature of about 650 degrees Celsius.

ALLOY 600

Alloy 600 has excellent resistance to oxidation at temperatures up to 1175 degrees Celsius and is also resistant to a variety of corrosive media. It retains its high strength up to about 650 degrees Celsius. Even at the lowest temperatures, Alloy 600 has good mechanical properties. Due to its resistance to chloride stress corrosion cracking, Alloy 600 is employed in components of power plants. This grade can be welded without thermal retreatment.

NICKEL ALLOYS

ALLOY 601

Alloy 601 has very good properties at high temperature and is oxidation-resistant as well as scale-resistant at temperatures of up to 1250 degrees Celsius. The high chromium content results in good resistance against oxidation, carburization and sulfurous media. The aluminum and nickel content result in a further improvement of the oxidation resistance.

ALLOY 625

Alloy 625 has excellent corrosion resistance with high strength and ductility at temperatures up to 700 degrees Celsius – applicable up to 1100 degrees Celsius. Alloy 625 is weldable without thermal retreatment. Alloy 625 is a non-magnetic, corrosion and oxidation-resistant, nickel-based alloy. The alloy has excellent fatigue strength and stress-corrosion cracking resistance to chloride ions. Some typical applications for Alloy 625 include heat shields, furnace hardware, gas turbine engine ducting, combustion liners and spray bars, chemical plant hardware, and special sea water applications.

ALLOY 800/ H /HT

Alloy 800 is an iron-nickel-chromium alloy with moderate strength and good resistance to oxidation and carburization at elevated temperatures. It is particularly useful for high-temperature equipment in the petrochemical industry because the alloy does not form the embrittling sigma phase after long time exposure at 1200°F (649°C). Excellent resistance to chloride stress-corrosion cracking is another important feature of Alloy 800. Alloy 800H is a solution heat-treated (2100°F/1150°C), controlled-carbon version of Alloy 800 with improved elevated temperature properties. It also has improved creep and stress-rupture properties.

ALLOY 825

Alloy 825 is a nickel-iron-chromium-molybdenum alloy with good corrosion resistance to sulphuric and phosphoric acids and sea water. It is similar to Alloy 800 but with improved resistance to aqueous corrosion. Although not fully resistant to stress-corrosion cracking in boiling magnesium chloride, Alloy 825 has good resistance in neutral chloride media. Alloy 825 has good resistance to reducing acids. It can be employed without thermal treatment after the welding process.

ALLOY C-276

Today probably one of the best among manifold alloys in the market. When employed in extremely corrosive, reducing and oxidising applications, Alloy C-276 has excellent resistance to strong oxidising media contaminated by chloride, dry chloride acid formate acid, acetic acid, acetic hydride solutions, sea water solutions and saline solutions. The alloy is resistant to the corrosive influence of wet hydrochloride acid, hydrochloridechlorine dioxide solutions.

ALLOY B-2

Alloy B-2 is an improved wrought version of Hastalloy B. Alloy B-2 has the same excellent corrosion resistance as Alloy B, but with improved resistance to knife-line and heat-affected zone attack. This alloy resists the formation of grain-boundary carbide precipitates in the weld heat-affected zone, thus making it suitable for most

NICKEL ALLOYS

ALLOY C-22

Alloy C-22 is a versatile nickel-chromium-molybdenum alloy with better overall corrosion resistance than other Ni-Cr-Mo alloys available today. Alloy C-22 has outstanding resistance to pitting, crevice corrosion and stress-corrosion cracking. It has excellent resistance to oxidising aqueous media including acids with oxidising agents, wet chlorine and mixtures containing nitric acid or oxidising acids with chlorine ions. It has exceptional resistance to a wide variety of chemical process environments, including strong oxidisers such as ferric and cupric chlorides, chlorine, formic and acetic acids, acetic anhydride, and sea water and brine solutions. chemical process applications in the as-welded condition. Alloy B-2 also has excellent resistance to pitting and stress-corrosion cracking. Alloy B-2 is particularly well suited for equipment handling hydrochloric acid at all concentrations and temperatures including the boiling point. It is also resistant to hydrogen chloride gas, and sulphuric, acetic, and phosphoric acids.

ALLOY 20

Alloy 20 is a high-alloyed stainless steel. Its corrosion properties surpass those of usual stainless steel qualities. For example, Alloy 20 has excellent stress corrosion to boiling 20-40% sulphuric acid. Although Alloy 20 was originally developed for usage in sulphuric environment, its range application has been steadily extended and today also includes machining of artificial rubber, plastic, synthetic fibre etc. In pharmaceutical and food producing applications, where purity has to be guaranteed, Alloy 20 is employed to prevent metallic contamination. The most important advantages of this grade are its excellent mechanical properties as well as its comparatively easy machineability.

Applications:

Power Generation

The power generation industry relies on machines such as gas turbines, steam turbines, and reciprocating compressors, all which are exposed to high levels of heat and possibly corrosive steam as well. Nickel alloy parts are used in power generation for their ability to resist corrosion, deformation, cracking, and metal fatigue in the presence of high temperatures.

Aerospace

The aerospace and aviation industries rely on nickel-based superalloys for their ability to retain strength and resist metal fatigue in high temperatures and during drastic temperature change. Also strong, lightweight, and aesthetic in appearance, nickel alloys are an excellent choice for the parts and components needed for aerospace and aviation operations.

Chemical Processing

From heat exchangers and furnaces to waste remediation units and flares, chemical processing and petrochemical processing require nickel alloys to resist corrosion, metal fatigue, and other problems associated with elevated temperatures and caustic media.

Pulp and Paper

While pulp and paper processing operations do not involve corrosive chemicals, they do involve high temperatures and oxidation associated with water reduction. Nickel alloys are an excellent choice for equipment in the pulp and paper plants as certain grades are highly resistant to oxidation, even at higher temperatures.

NICKEL ALLOYS

CHEMICAL COMPOSITION OF NICKEL ALLOYS

Material	UNS no.	Werkst. Nr.	Ni min	Co max	Cr	Mo	W	Fe max	Si max	Mn max	C max	Cu max	Al max	Ti max	S max	p max	Density	Bar/Billet	Forging	Flanges	Tube	Pipe	Plate	Fitting	
																						SMLS/WLD			
Alloy 200	N02200	2.4066	99.0	---	---	---	---	0.4	0.35	0.35	0.15	0.25	---	---	0.01	---	8.89	B160	B564	B564	B163/B730	B161/B725	B162	B366	
Alloy 201	N02201	2.4068	99.0	---	---	---	---	0.4	0.35	0.35	0.02	0.25	---	---	0.01	---	8.89	B160	---	---	B163/B730	B161/B725	B162	B366	
Alloy 400	N04400	2.4360	63.0	---	---	---	---	2.5	0.5	2.0	0.30	28-34	---	---	0.024	---	8.83	B164	B564	B564	B163/B730	B165/B725	B127	B366	
Alloy K500	N05500	2.4375	63.0	---	---	---	---	2.0	0.5	1.5	0.25	27-33	2.3-3.2	0.4-0.9	0.01	---	8.46	B865	B865	B865	---	---	---	---	
Alloy 600	N06600	2.4816	72.0	---	14-17	---	---	6-10	0.5	1.0	0.15	0.5	---	---	0.015	---	8.42	B166	B564	B564	B163/B516	B167/B517	B168	B366	
Alloy 601	N06601	2.4851	58-63	---	21-25	---	---	Rest	0.5	1.0	0.10	1.0	1-1.7	---	0.015	---	8.20	B166	---	---	B167	B167	B168	B366	
Alloy 625 ¹	N06625	2.4856	58.0	1.0	20-23	8-10	---	5.0	0.5	0.5	0.10	---	0.4	0.4	0.015	0.015	8.44	B446	B564	B564	B444/B704	B444/B705	B443	B366	
Alloy 800	N08800	1.4876	30-35	---	19-23.5	---	---	Rest	1.0	1.5	0.10	0.75	0.15-0.6	0.15-0.6	0.015	---	8.00	B408	B564	B564	B163/B515	B407/B514	B409	B366	
Alloy 800H	N08810	1.4876	30-35	---	19-23.5	---	---	Rest	1.0	1.5	0.05-0.1	0.75	0.15-0.6	0.15-0.6	0.015	---	8.00	B408	B564	B564	B163/B515	B407/B514	B409	B366	
Alloy 800HT	N08811	1.4876	30-35	---	19-23	---	---	Rest	1.0	1.5	0.06-0.1	0.75	0.15-0.6	0.15-0.6	0.015	---	8.00	B408	B564	B564	B163/B515	B407/B514	B409	B366	
Alloy 825	N08825	2.4858	38-46	---	19-23.5	2.5-3.5	---	Rest	0.5	1.0	0.05	1.5-3	0.2	0.5-1.2	0.03	---	8.18	B425	B564	B564	B163/B704	B423/B705	B424	B366	
Alloy C276	N10276	2.4819	Rest	2.5	14-16.5	15-17	3-4.5	4-7	0.08	1.0	0.01	---	---	---	0.03	0.04	8.87	B574	B564	B564	B622/B619	B622/B619	B575	B366	
Alloy C22 ²	N06022	2.4602	Rest	2.5	20-22.5	12.5-14.5	2.5-3.5	2-6	0.08	0.5	0.01	---	---	---	0.2	0.2	8.69	B574	B564	B564	B622/B619	B622/B619	B575	B366	
Alloy B-2	N10665	2.4617	Rest	1.0	1.0	26-30	---	2.0	0.10	1.0	0.02	---	---	---	0.03	0.04	9.22	B335	B564	B564	B622/B619	B622/B619	B575	B366	
Alloy 20	N08020	2.4660	32-38	---	19-21	2-3	---	Rest	1.0	2.0	0.07	3-4	---	---	0.035	0.045	8.10	B473	B462	B462	B729/B468	B729/B464	B463	B366	

¹ Nb/Ta 3.15-4.15 ² V 0.35max

CHEMICAL COMPOSITION OF SPECIAL STAINLESS STEEL

Material	UNS no.	Werkst. Nr.	Ni Min	Co max	Cr	Mo	W	Si max	Mn max	C max	Cu max	S max	p max	Density	Bar/Billet	Forging	Flanges	Tube	Pipe	Plate	Fitting
310S	S31008	1.4845	19-22	---	24-26	---	---	1.50	2.00	0.08	---	0.030	0.045	7.90	A479	A182	A182	A213/A249	A312	A240	A403
904L	N08904	1.4539	23-28	---	19-23	4-5	---	1.00	---	0.02	1-2	0.035	0.045	8.05	B649	B459	---	B677/B674	B677/B673	B625	B366
2205 ¹	S31803	1.4462	4.5-6.5	---	21-23	2.5-3	---	1.00	2.00	0.03	---	0.020	0.030	8.00	A479	A473	A182	A789	A790	A240	A815
2507 ²	S32750	1.4410	6-8	---	24-26	3-5	---	0.80	1.20	0.03	0.50	0.020	0.035	8.00	A479	A473	A182	A789	A790	A240	A815
S. Duplex ³	S32760	1.4501	6-8	---	24-26	3-4	0.5-1	1.00	1.00	0.03	0.5-1	0.010	0.030	8.00	A479	A473	A182	A789	A790	A240	A815

¹ N 0.08-0.20 ² N 0.24-0.32 ³ N 0.20-0.30



STAINLESS STEELS OF AUSTENITIC GRADE

TP304

Basic grade of stainless steel. Good resistance to high temperature oxidation up to 900°C, very good mechanical strength and creep resistance. **Main applications:** pipe and heat exchanger tubes for chemical and petrochemical industries and for boilers.

TP304L

Low Carbon version of TP 304, guaranteed no creep resistance above 500°C. Good high temperature oxidation up to 900°C. **Main applications:** pipe and heat exchanger tubes in chemical, petrochemical and food industries.

TP310

This grade, combining excellent high temperature properties with good ductility and weldability, is designed for high temperature service. It resists oxidation in continuous service at temperatures up to 1150°C provided reducing sulphur gases are not present. It is also used for intermittent service at temperatures up to 1040°C.

TP310S

This grade is used when the application environment involves moist corrosive elements in a temperature range lower than that which is normally considered "high temperature" service. The lower carbon content of TP310S does reduce its high temperature strength compared to TP310.

TP316

Good resistance to high temperature oxidation up to 900°C, very good mechanical strength and creep resistance. **Main applications:** pipe and heat exchanger tubes in chemical and petrochemical plants, boilers and food industry.

TP316TI

General corrosion resistance properties rather similar to TP316, good resistance to high temperature oxidation up to 900°C. **Main applications:** pipe and heat exchanger tubes in chemical, petrochemical and food industries, boilers and furnaces.

TP317L

Properties similar to TP316L **Main applications :** pipe and heat exchanger tubes

TP904L

This high-alloy austenitic is very resistant to attack from diluted sulphuric acid, phosphoric acid and acetic acid. It resists pitting in neutral chloride solutions. Its resistance to stress corrosion cracking in some hot chlorides is much superior to that of the lower nickel austenites. This steel has good formability and weldability. Ferritic Grade

STAINLESS STEEL

TP347

Properties similar to those of TP321. **Main applications** : pipes and heat exchanger tubes in chemical and petrochemical plants.

TP321

High carbon steels are prone more to intercrystalline attack in weld zones and slower cooling sections. These steels resist such attacks through its stabilization with Ti. The corrosion behaviour of this alloy in natural environments is very similar to the TP304/304L alloys. Satisfactory in many low-chloride waters, it is prone to pitting or crevice corrosion in sea water, water treatment, and galvanic protection. Deaeration can influence the performance.

FERRITIC GRADE

TP446

Highest heat resistance ferritic stainless steel. Excellent corrosion resistance to nitric acid, concentrated sulfuric and most alkalis. Good high temperature resistance to 1100°C - 1140°C. **Main applications:** oil and gas furnaces, steam boilers, muffle tubes.

CHEMICAL COMPOSITION CHART

Material	UNS	Werkst. nr.	C max	Mn max	P max	S max	Si max	Cr	Ni	Mo	Other elements
304	S30400	1.4301	0.08	2	0.045	0.030	1.00	18 - 20	8 - 10.5	---	---
304L	S30403	1.4306	0.03	2	0.045	0.030	1.00	18 - 20	8 - 12	---	---
310S	S31008	1.4845	0.08	2	0.045	0.030	1.50	24 - 26	19 - 22	---	---
316	S31600	1.4401	0.06	2	0.045	0.030	1.00	16 - 18.5	10.5 - 13.5	2 - 2.5	---
316L	S31603	1.4404	0.03	2	0.045	0.030	1.00	16 - 18.5	11 - 14	2 - 2.5	---
316Ti	S31635	1.4571	0.08	2	0.045	0.030	1.00	16 - 18.5	10.5 - 13.5	2 - 2.5	Ti = 5°C min; 0.8max
317L	S31703	1.4438	0.03	2	0.045	0.030	1.00	17.5 - 19.5	13 - 16.5	3 - 4	---
321	S32100	1.4541	0.08	2	0.045	0.030	1.00	17 - 19	9 - 12	---	Ti = 5°C min; 0.6max
347	S34700	1.4550	0.08	2	0.045	0.030	1.00	17 - 19	9 - 13	---	Nb + Ta = 10°C min; 1max
904L	N08904	1.4539	0.02	--	0.045	0.035	1.00	19 - 23	23 - 28	4 - 5	Cu = 1.0/2.0
446	S44600	1.4763	0.20	1.5	0.040	0.030	1.00	23 - 27	-	-	N = 0.25 max



CHARACTERISTICS

Referred to as the “space age metal”, Titanium is low in density, strong and lustrous. Titanium is a light metal highly resistant to corrosion. It is also highly resistant to heat with a melting temperature as high as 1668 degrees. Its melting point is higher than that of steel. Although heat conductivity of Titanium is almost the same as that of stainless steel, its weight is almost half of stainless steel. Titanium can be alloyed with iron, aluminum, vanadium and molybdenum among other elements, to produce strong, lightweight Alloys for multiple high end applications. Titanium is also non-toxic and non-allergenic.

Titanium is recognised for its high strength-to-weight ratio with low density and good ductility.

The relatively high melting point makes it useful as a refractory metal. It is fairly hard and a poor conductor of heat and electricity. Titanium structures have a fatigue limit which

guarantees longevity in required applications. It resists tarnishing in room temperature but forms a passive, protective oxide coating, with increased corrosion resistance when exposed to elevated temperature in air.

Outstanding Corrosion Resistance

The distinct chemical property of Titanium is its excellent resistance to corrosion. Titanium is immune to corrosive attack by salt water or marine atmospheres. It also exhibits exceptional resistance to a broad range of:

- Acids
- Alkalis
- Natural waters, fresh and salt
- Corrosive gases
- Reducing atmospheres
- Organic media

TITANIUM

Material	UNS No.	Werkst. nr.	C max	Fe max	H max	N max	O max	V max	Al max	Ti	Density gm/cc	Min. Tensile (KSI)	Min. Yield (KSI)	Hardness	Modulus of elasticity	Poisson's Ratio
Grade 2	R50400	3.7035	0.10	0.30	0.015	0.03	0.25	---	---	REST	4.51	50	40	14.9	103 GPa	0.34 - 0.10
Grade 5	R56400	3.7165	0.10	0.40	0.015	0.05	0.20	3.5- 4.5	5.5- 6.75	REST	4.45	130	120	16.4	114 GPa	0.30 - 0.33

TITANIUM

APPLICATION AREAS:

Aerospace

About 50% of Titanium produced is used for aerospace parts including engine components such as blades, discs, rings and engine cases as well as airframe components including bulkheads, tail section, landing gear, wing support and fasteners. All these together amount to a substantial proportion of the mass of modern aircraft.

Chemical plants

Titanium is highly corrosion resistant. It is used in many types of chemical equipment.

Sea water usage

Due to its high corrosion resistance to sea water, Titanium is used in nuclear and fossil power stations, heat exchangers in desalination plants, condensers which cool the steam from turbines with sea water. Because Titanium does not corrode, the wall thickness of the tube can be as thin as 0.5 mm. Usage of Titanium in chemical, nuclear and fossil plants makes up approximately a third of the world production. In the oil platform industry, Titanium was previously employed

"topside" for sea water management systems. However, due to its low modulus, high fracture toughness and fatigue resistance, Titanium is now being used for stress joints and complete riser systems.

Consumer and Architectural

Too expensive for the general consumer market, Titanium nevertheless finds special high end application in those products where weight reduction is critical as in automotive parts for automobile and motorcycle racing. Also for sports goods such as tennis rackets, golf clubs, helmet grills, bicycle frames, spectacle frames, designer jewelry and watch cases. It is occasionally used for memorial structures that are sheathed in Titanium panels.

Medical

Because of its biocompatibility (non-toxic), Titanium is used in many medical applications surgical implements, body and dental implants.



CHARACTERISTICS

Wear resistant steel plates are the combination of high hardness, high strength and good toughness, hence these plates are the obvious choice for applications in which wear had previously often given rise to problems. The high wear resistance of the plate increases the useful life of components such as tipper bodies, excavator buckets, crushing mills and similar equipment. The hardness of the plate is achieved by effective quenching in water quenching line and oil quenching line. This method enables high hardness to be achieved in spite of a low content of alloying elements in the steel. The resulting wear plate is easy to machine, bend and weld.

VARIOUS PATENT GRADES

Quenched and tempered steels	Hardness (HBW)	Certificate	Plate thickness in mm	Width in mm	Length mm
200 HB Steel	200 - 240	Mill Test Certificate	6 - 50	1250	4000 - 5000
Brands	LSLAS07(LLOYDS STEEL), SAILHARD (SAIL)				
400 HB Steel	370 - 430	3.1B acc. to EN 10204	4 - 50	2000	6000
Brands	Hardox 400(SSAB), Dillidur 400V (Dillinger Hütte), SUMIHARD- K400(SM) etc.				
500 HB Steel	370 - 430	3.1B acc. to EN 10204	6 - 50	2000	6000
Brands	Hardox 500(SSAB), Dillidur 500V (Dillinger Hütte), SUMIHARD-K500(SM) etc.				

*Technical specification for the brands can be provided on request

*Above given name are trademarks of specific manufacture

ABRASION & WEAR-RESISTANT PLATES

APPLICATIONS

Industry	Application
Construction and Automotive Industries	<ul style="list-style-type: none">• Bulldozer shovels and buckets, Slush plates for bulldozers, Exterior linings of bulldozer buckets• Trailer beds• Vessels for dump and cargo trucks• Dredger buckets• Dump Trucks, Loaders, Industrial trucks, Lorries, Excavators
Cement and Mining	<ul style="list-style-type: none">• Lining material for ready-mixed concrete turbine mixer• Paddle for above• Conveyor chute for concrete mixing plant• Pug mill for soil cement• Conveyor pipe for solids (pneumatic pipelines for coal mines)
Chemical Industry	<ul style="list-style-type: none">• Agitators for asphalt plants and finishers• Sand conveyor pipe for sand cracking in naphtha cracking plants• Sulfide mineral bucket elevators
Steel and Gas	<ul style="list-style-type: none">• BF top swivel chute• BF stationary chute, liner, upper hopper liner, gate liner• Screens for ores and switching damper• Bypass chute for ore conveyors• Chute for ore conveyors• Tripper chute for ore conveyors• Tripper chute for coke conveyors• Coke conveyor chute and stacker chute• Lining for rotary mixers• Drop chute receiver for blending conveyor in sintering plants• Liner for vibrato-feeders in sintering plants• Raw material and sole roll feeders
Others	<ul style="list-style-type: none">• Earth drills, Shear liners, Crushers• Sieves, Feeders, Measuring Pockets, Skips, Cutting edges, Knives, Gears, etc.



Our company is a specialist steel stockholder focusing in boiler. We stock pressure vessel quality plate in ASME and ASTM grades principally for use in the oil and gas industry.

We have over 5000 + MT of boiler plate available ex-stock in A516 grades with plates up to 125mm thick, 3m wide or 12m long immediately available.

As a niche steel stockholder we focus on a limited number of grades to ensure a wide range of plates, good availability and a competitive price. In ASTM SA 516 we stock grades 60 and 70.

Our steel is all from reputed manufacturer from Ukraine and Romania. It is certified to EN10028 3.1 or 3.2 and can be further tested to your specific requirements.

The standard requirements for ASTM A516 physical and chemical characteristics are given in the tables below. Our steel plates are of high quality.

Mechanical Properties:

	A516 Grade 60	A516 Grade 70
Tensile Strength (ksi)	60-80	70-90
Tensile Strength (Mpa)	415-550	485-620
Yield Strength (ksi)	32	38
Yield Strength (Mpa)	220	260
Elongation in 200mm(%)	21	17
Elongation in 50mm (%)	25	21
Max Thickness (mm)	205	205

BOILER QUALITY PLATES

Chemical Properties:

	Composition (%)	
	A516 Grade 60	A516 Grade 70
Carbon © (Max)		
< 12.5mm Thick	0.21	0.27
> 12.5mm - < 50mm Thick	0.23	0.28
> 50mm - = 100mm Thick	0.25	0.30
> 100mm - < 200mm Thick	0.27	0.31
> 200mm Thick	0.27	0.31
Manganese (Mn)		
< 12.5mm Thick		
Heat Analysis	0.6-0.9	205
Product Analysis	0.55-0.98	0.79-1.3
> 12.5mm Thick		
Heat Analysis	0.85-1.2	0.85-1.2
Product Analysis	0.79-1.3	0.79-1.3
Phosphorous (P)(max)	0.035	0.035
Sulphur (S) (max)	0.035	0.035
Silicon (Si)		
Heat Analysis	0.15-0.4	0.15-0.4
Product Analysis	0.13-0.45	0.13-0.45



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