NICKEL 200

Commercially pure (99.6%) wrought nickel with good mechanical properties and resistance to a range of corrosive media. Good thermal, electrical and magnetostrictive properties. Used for variety of processing equipment, particularly to maintain product purity in handling foods, synthetic fibers and alkalies. Standard product forms are round, flats, pipe, tube, plate, forging stock, strip and wire.

Limiting Chemical Composition %

Ni[a].....99.2 min	Mn.....0.35 min	S.....0.01 max
Cu.....0.25 min	C .....0.15 min	
Fe.....0.40 max	Fe.....0.35 max	

UNS N02200 BS 3072-3076 (Na11) ASTM B 160 B 163
B 725 B730 ASME SB. 160-SB. 163,
Boiler Code Sections III, VIII, IX

Specifications and Designations

DIN 17740, 17750-17754
Werkstoff Nr. 2.4060
2.4066

NICKEL 201

Commercially pure (99.6%) wrought nickel essentially the same as Nickel 200 but with a lower carbon content to prevent embrittlement by intergranular carbon temperatures over 600 oF (3015oC). Lower carbon content also reduces hardness Nickel 201 particularly suitable for cold-formed items. Standard product forms are round, flats, pipe, tube, plate, sheet, forging stock, strip and wire.

Limiting Chemical Composition %

Ni[a]..... 99.0 min	Mn..... 0.35 max	S.....0.01 max
Cu.....0.25 max	C .....0.02 max	
Fe..... 0.40 max	Fe.....0.35 max	

UNS N02201 BS 3072-3076 (Na12) ASTM B 160 B 163 B 725,
B730 ASME SB. 160-SB. 163, Boiler Code Sections III, VIII, IX

Specifications and Designations

SAE AMS 5553
DIN 17740, 17750-17754
Werkstoff Nr. 2.4061, 2.4068
VdTüV 345

MONEL 400

A nickel-copper alloy with high strength and excellent corrosion resistance in a range of media including sea water hydrofluoric, chemical and hydrocarbon processing equipment, valves, pumps, shafts, fitting, fasteners and heat exchangers. Standard product forms are round, hexagon, flats, forging stock, pipe, tube, plate, sheet, strip and wire.

Limiting Chemical Composition, %

Ni[a]..... 63.0 min	Mn ..... 2.0 max	Si ..... 0.5 max
Cu 28.0-34.0	C ..... 0.3 max	
Al ..... 2.5 max	S ..... 0.024 max	

UNS NO4400 MIL-T-1368,
BS 3072-3076 (NA 13)
ASTM B Boiler Code Section III, IV, VIII, IX
NACE MR-01-75

Specifications and Designations

MONEL IS REGISTERED TRADEMARK OF SPECIAL METAL LTD.

MIL-T-23520
Werkstoff Nr. 2.4360, 2.4361
QQ-N-281

MONEL K-500

Corrislon-hardenable nickel-copper alloy that combines on resistance of Monel alloy 400 with greater hardness. It also has low permeability and is to under -1 5PF (-101 T).Us ed for pump shah, and value instruments, doctor blades and scrapers, trim, fasteners, and marine propeller shafts. Product forms are round, hexagon, flats, forging tube, plate, sheet, strip and wire.

Limiting Chemical Composition, %

Ni[a]. .....63.0 min	Ti 0.35-0.85	Mn .....1.5 max
Cu 27.0-33.0	Fe ..... 2.0 max	S .....0.01 max
AL..... 2.30-3.15	C .....0.25 max	Si .....0.5 max

MONEL ALLOY K-500
BS 3072-3076 (NA 13)
ASTM B Boiler Code Section VIII
NACE MR-01-75

Specifications and Designations

MIL-N-24549 DIN 17743,
17752, 17752
WERKSTOFF NR. 2.4375
QQ-N-286

INCONEL 600

A nickel-chromium alloy with good oxidation resistance at high temperatures and resistance to chloride-ion stress corrosion cracking corrosion by high-purity water and causing corrosion. Used for furnace components, in chemical and food processing, in nuclear engineering and for sparking electrodes. Standard product forms are round, hexagon, extruded section, flats, forging stock, pipe, tube, plate, sheet,strip and wire.

Limiting Chemical Composition %

Ni[a]..... 72.0 min
Cr 14.0-17.0
Fe 6.0- 10.0
C.....0.15 max
Mn..... 1.0 min
S .....0.015 max
S .....0.5 max
Cu.....0.5 max

Specifications and Designations

DIN 17742, 17750-17754
Werkstoff No. 2.4061

INCONEL 601

A nickel-chromium alloy with an addition of aluminm for out standing resistance to oxidation and other forms of high temperature corrosion. It also has high mechanical properties at elevated temperatures. Used for industrial furnaces; petrochemical and other process equipment; such as baskets, muffles and retorts, petrochemical and other process equiupment; and gas-turbine components, Standard product forms are round,flats, forging stock, pipe, tube, plate, sheet,strip and wire.

UNS NO6601 ASME Boiler Code Section I, III, VIII, IX
SAE AMS 5540, 5580, 5665 ASTM B 166-B 165 B 68

Ni[a]..... 58.0-63.0
Cr 21.0-25.0
Fe 1.0-1.7
Fe.....Remainder
C..... 0.10 max
Mn.....1.0 max
Si.....0.50 max
S.....0.015 max
Cu.....1.0max

Specifications and Designations

UNS NO6601
ASME Boiler Code Section VIII
SAE Ams 5715,5870
ASTM B 166-B 165
DIN 17742, 17750-17752
Werkstoff No. 2.4851

INCONEL-625

A nickel-chromium-molybdenum alloy with an addition of niobium that acts with the molybdenum to stiffen the alloy's matrix and thereby provide high strength without a strengthening heat treatment. The alloy resists a wide range of severely corrosive environments and is especially resistant to pitting and crevice corrosion. Used in chemical processing, aerospace and marine engineering, pollution control equipment and nuclear reactor. Standard product forms are round, flats, forging stock, extruded section, pipe, tube, plate, sheet, strip and wire.

Ni..... 58.0 min
Cr 20.0-23.0
Mo..... 8.0 - 10.0
Nb[a].....3.15 - 4.15
Fe .....5.0 max
C.....0.10 max
Mn.....0.50 max
Si .....0.50 max
S .....0.015 max
Al .....0.40 max
Ti..... 0.40 max
P.....0.015 max
Co[b].....1.0 max

*Plus Ta [b]if determined

Specifications and Designations

UNS N06625
BS 3072, 3074, 3076 WA21)
ASTM B443, B444, B446
B564, B704, B705, B761
ASME SB-443, SB-44, SB-446, SB-564
Boiler code Sections I, III, VIII, IX
SAE AMS 5561, 5599, 5666, 5337
DIN 17744, 17750-17752, 17754
Werkstoff No. 2.4856
NACE MR0175
AFMOR NC 22.0NB

INCONEL 800

A nickel-iron-chromium alloy with good strength and excellent resistance to oxidation and carburization in high temperature atmospheres. environments. The alloy maintains a stable, austenitic structure during prolonged exposure to high temperature. Used for process piping, heat exchangers, carburizing equipment, heating-element sheathing, and nuclear steam-generator tubing. Standard product forms are round, flats, forging stock, pipe, tube, plate, sheet, strip and wire.

Limiting Chemical Composition %

Ni.....30.0-35.0 min
Fe..... 39.5 min
Cr..... 19.0-23.0
C..... 0.10 max
Mn.....1.50 max
S..... 0.015 max
Si.....1.0 max
Cu.....0.75 max
Al.....0.15-0.60
Ti 0.15-0.60

UNS NO 8800
8S 3072-3076 (NA 15)
ASTM B-163, B-407-B409
ASME SB-163, SB 407-SB-409, SB-564
Boiler Code Section I, III, VII, IX

Specifications and Designations

S.E.W. 470
Werkstoff Nr. 14876
B514, B515, B564, B751

INCONEL 825

A nickel-chromium alloy with additions of molybdenum and copper. It has excellent resistance to both reducing and oxidizing acids to stress corrosion cracking and to localized attack such as pitting and crevice corrosion. The alloy is especially resistant to sulfuric and phosphoric acids. Used for chemical processing, pollution-control equipment, oil and gas well piping, nuclear fuel reprocessing, acid production and pickling equipment. Standard product forms are round, flats, forging stock, pipe, tube, plate, sheet, strip and wire.

Limiting Chemical Composition %

Ni..... 38.0-46.0
Fe ..... 22.0 min
Cr..... 19.5-23.5
Mo..... 2.5-3.5
Cu.....1.5-3.0
Ti.....0.6-1.2
C.....0.05 max
Mn..... 1.0 max
S .....0.03 max
Si ..... 0.5 max
Al .....0.2 max

*Plus Ta [b]if determined

Specifications and Designations

UNS NO 8825
BS 3072-3074, 3076 (NA16)
ASTM B-163, B-423, B-425
ASME SB-163, SB-423-SB-425
Boiler Code Section III,
VIII, IX
DIN 17744, 17750-17752, 17752
Werkstoff No. 24858
VdrUV 432
AFNOR NFe32 C200U

INCONEL 800HT

A nickel-iron-chromium alloy having the same basic composition as INCONEL 800 but with significantly higher creep-rupture strength. The higher strength results fromclose control of the carbon, aluminium and titanium contents in conjuction with a higher-temperature anneal. Used in chemical and petrochemical processing in power plants for superheater and reheater tubing in industrial furnaces and not for heat-treating equipments, standard product forms are round, flats, flats, forging stock, pipe, tube, plate, sheet, strip and wire.

Limiting Chemical Composition %

Ni.....30.0-35.0	Mn.....1.50 max	Al.....0.15-0.60
Fe.....39.5 min	S.....0.015 max	Tl.....0.15-0.60
Cr.....19.0-23.0	Si.....1.0 max	Al+Ti....0.85-1.20
C.....0.06-0.10	Cu.....0.75 max	

Specifications and Designations

UNS NO 8811
ASTM B-163, B407- B409
B514, B515, B564
BS 3072, 3074, 3076 (NA15H)

ASME SB-163, SB-407-SB-409
SB-564, Boiler Code
Sections I, VIII
Workstoff Nr. 14876
SEW 471

HASTELLOY C - 276

A nickel-Molybdenum-chromium alloy with an addition of Tungsten having excellent corrosion resistance in a wide range of severe environments. The high molybdenum content makes the alloy especially ressiatant to pitting and crevice corrosion. The low carbon content minimizes carbide precipitation during welding to maintain corrosion resistance in as welded structures. Used in pollution control, chemical processing, paper and pulp production and waste treatment standard product forms are round, forging stock, tube, pipe, plate, sheet, strip ans wire.

Limiting Chemical Composition %

Ni.....Remainder	Co.....2.5 max	S.....0.03 max
Mo.....15.0-17.0	Mn.....1.0 max	Si.....0.08 max
Cr.....14.5-16.5	C.....0.01 max	
Fe.....4.0-7.0	V.....0.35 max	
W.....3.0-4.5	P.....0.04 max	

Specifications and Designations

UNS N10276
ASTM B-574, B-575, B-619
B-622, B-626, B-751
NACE MR-01-75
DIN 17744, 17750-17752

ASME SB-574, SB-575, SB-619
SB-622,SB-626, Boiler Code
Sections I,III, VIII, IX.
Workstoff Nr. 2.4819.

HASTELLOY C - 22

(UNS N06022; W. Nr. 2, 4602; NiC21Mo14W) is a fully austenitic advanced temperatures. This alloy provides exceptional resistance to general corrosion, pitting, crevice corrosion, chemical/petrochemical processing, pollution control (flue gas desulfurization), power, marine, pulp and paper processing and waste disposal industries used in pollution control, chemical processing pulp and paper processing, and waste disposal industries used in pollution control, chemical processing pulp and paper production and waste treatment standard product forms are round, forging stock, tube, pipe, plate, sheet, strip and wire

Limiting Chemical Composition %

Ni.....Remainder	Cr.....20.0-22.5	Mo.....12.5-14.5
Fe.....2.0-3.5	W.....2.5-3.5	Co.....2.5 max
V.....0.35 max	C.....0.015max	
Mn.....0.05 max	S.....0.02 max	
Si.....0.08 max	P.....0.02 max	

Specifications and Designations

UNS NO 6022
ASTM B-574, B-575, B-619
B-622, B-626
DIN 17744, 17750

ASME SB-574, SB-575, SB-619
SB-622, SB-626
Section VIII Div.I
Werkstoff Nr. 2.4602

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NICKEL ALLOYS

SMO - 254

Avesta Sheffield 254 SMO is an austenitic stainless Steel which due to its high Molybdenum possesses very high resistance to pitting and crevice corrosion. The steel grade was developed by Avesta Sheffield for use in Halide-containing environments such as seawater. 250 SMO also shows good resistance to uniform corrosion and especially in acids containing halides. this steel grade is superior to conventional stainless steel.

254 SMO is a registered trademark of Avesta Sheffield AB.

The high levels of molybdenum in particular but also of Chromium and Nitrogen endow 254 SMO with extremely good resistance to pitting and crevice corrosion. The addition of copper provides improved resistance in certain acids. Further more, due to its relatively high nickel content in combination with the high levels of chromium and molybdenum 254 SMo possesses good resistance to stress corrosion cracking

Limiting Chemical Composition %

Ni.....I...17.5-18.50	Mn.....1.0
Mo.....6.00-6.50	Cu.....0.50-1.00
Cr.....19.50-20.50	S.....0.01
P.....0.03	Si.....0.80
C.....0.02	N.....0.18-0.22

Alloy - 904L

904L is a non-stabilised lowcarbon high alloy austenitic stainless steel, The addition of copper to this grade gives greatly improved resistance to strong reducing acids. particularly sulphuric acid. It is also highly resistant to chloride attack-both pitting / crevice corrosion and stress corrosion and stress corrosion cracking.

Limiting Chemical Composition %

Ni.....23.0-28.0
Mo.....4.00-5.00
Cr.....19.0-23.0
P 0.045
C.....0.020 max
Mn.....2.0 max
Cu.....1.0-2.0
S.....0.035 max
Si.....1.00 max
C.....0.020

Alloy - 20

Alloys 20 is one of the so-called "super" stainless steels that was designed for maximum resistance to acid attack, It's nickel, chromium, molybdenum and copper content contribute to its overall resistance to chloride on stress corrosion cracking and general pitting attack. The alloy is stabilized with columbium to minimize carbide precipitation during welding. It has good mechanical properties and can be fabricated with comparative ease. Although the alloy was designed for use in sulfuric acids related industries, it finds wide usage throughout the chemical processing industry. It also is used in sulfuric acid related industries, it finds wide usage throughout the chemical processing industry. It also is used for processing pharmaceuticals, food, gasoline, solvents, plastics, explosives, synthetic fibres and many other products.

Limiting Chemical Composition %

Ni.....32-38.0
Mo.....2.00-3.00
Cr.....19.0-21.0
p.....0.045 max
C.....0.07 max
Mn.....2.0 max
Cu.....3.0 - 4.0
Fe.....Bal
S.....0.035 max
SI.....1.00 max
Cb.....1.00 max

TITANIUM

TITANIUM GRADE 1

Grade 1 has very good weld ability. Being substantially single-phase material, the micro structure of the alpha phase is not affected greatly by thermal treatments or welding temperatures. Therefore, themechanical properties of a correctly welded joint are equal to, or exceed those of the parent metal and show good ductility.

TITANIUM GRADE 2

Grade 2 has very good weld ability. Being substantially single phase material, the micro structure of the alpha phase is not affected greatly by thermal treatments or welding temperatures. Therefore, the mechanical properties of a correctly welded joint are equal to, or exceed those of the parent metal and show good ductility.

Compressor blades, discs and rings for jet engines, aircraft components, pressure vessels, rocket engine cases, offshore pressure vessels.

TITANIUM GRADE 5

Since the two-phase micro ctructure of alpha-beta titanium alloys responds to thermal treatment, the temperatures encountered during the welding cycle can affect the material being welded.

CUPRO - NICKEL (90 /10)

Widely used in condensers, coolers and heat exchangers, where corrosion resistance and erosion is paramount, yet maintaining a high conductivity rate. To be used preferably in marine conditions, forms a protective film which is multi layered in flowing sea water. Resist marine bifouling cooling water speed 2.5m/s working temperature approx. 250 deg.C

Ni.....10
Fe.....1
Mn.....
Cn.....102
Mn.....2.0 max

CUPRO - NICKEL (70 /30)

Improved corrosion resistance and almost insensitive to stress corrosion, this alloy will give superior result in high velocity polluted water including sea water. A reduced thermal conductivity level but will retain at moderately increases temperatures

Ni.....29 - 32
Fe.....0.5 - 1.5
Mn.....0.4 - 1
Cu.....Remaining

SUPER DUPLEX UNS S32750

UNS S32760(TSD2507) is a super ferritic-austenitic grade with high mechanical properties and superior corrosion resistance. Besides the ferritic-austenitic structure, TDS2507nhas corrosion resistance to pitting and crevice corrosion and is therefore particularly suitable for sea water applications and for process systems on offshore platforms, respectively in all situations where there is a risk of stress corrosion. The high tensile properties are twice comparing with TP 316L stainless steel. The service is between-50° c up to +275° c. More detailed information about this particular grade are described in our TSD 2507 data sheet.

DUPLEX UNS S310803

A widely used duplex steel combining high strength and corrosion restance in various organic acids, unorganic acids, aggresive cooling waters and hydrous H2s/NaCl mixtures. With a near equal mix of austenitical and ferrite, they give yield strength 30% higher and specifically to pitting and crevice corrosion. Their resistance to stress-corrosion cracking in neutral chlorides is superior to that of the austerities. In high chloride acid or moderately sour environments where hydrogen or sulphide stress cracking is more likely, higher alloyed austenitic need also to be considered. Impact values are high and transitions temperatures of base materials wary around 50° c. However, the proportion and orientation of ferrite in weilds and base materials may significantly affect toughness at subzero temperatures. Exposures to moderate and high temperatures and less rapid cooling may cause embrittlement.

AUSTENITIC STEELS

STAINLESS STEEL 304

The most popular stainless steel and economic balance of alloying elements to ensure its good cold, corrosion resistance, toughness and good mechanical properties with no excessive work-hardening. It performs well in unpolluted atmosphere but can tarnish or lightly rust in damp atmospheres around some industrial and on/offshore locations. the steel has been used extensively for potable water tubing and in fresh feed water systems where precautions are taken to avoid crevice attack under deposits etc. Performance in aerated seawater is not good without adequate galvanic or cathodic protection, stability and toughness at cryogenic temperatures is high.

STAINLESS STEEL 304L

Low carbon version of TP 304 guaranteed no creep resistance above 500° c. Good high temperature oxidation resistance up to 900° c. General corrosion characteristics are similar to TP 304. Stability and toughness at cryogenic temperatures is high. Main applications : pipe and heat exchanger tubes in chemical, petrochemical and food industries.

STAINLESS STEEL 316

This is one of the family of 17% CR, 12-13% Ni Steels containing Mo of 2,0.2,4% stabilized with Ti which minimizes chromium carbide precipitation and improves resistance to inter granular corrosion in the damp industrial or coastal atmospheres.

STAINLESS STEEL 316L

These grades belong to the family of 17% Cr 12-13% Ni steels containing 2.0,3.0% Mo. This standard grade is used where specific attributes of other member of the family are not necessary eg. no likely hood of intercrystallic corrosion caused by welding. Special for TP 316L, low carbon content minimizes chromium carbide precipitation and improves resistance to intercrystaline corrosion. After TP 304/304L type steel, these TP 316/316L grades are the most widely used austenilics of Europe, they perform better than TP 304/304L and ferritic grades. In low temperature seawater they offer limited resistance to pitting but susceptable to crevice attack. their short and long time properties at elevated temperatures are also superior to these of comparable TP 304/304L grades. main applications: Pipe and heat exchanger tubes in chemical and petrochemical plant, in boilers and food industry.

STAINLESS STEEL 317L

Type 317L is a molybdenum containing austenitic stainless steel intended to provide improved corrosion resistnce relative to type 316L in highly corrosive process environments, particularly those containing chlorides or other halides. The low carbon permits type 317L to be welded without sensitization to intergranular corrosion resulting from chromium carbide precipitation in the grain boundaries. Type 317L is non-magnetic in the annealed condition but may becomes slightly magnetic as a result of welding.

CHEMICAL COMPOSITION, wt. pct.

Carbon.....0.030 max	Chromium.....18.0-20.0
Manganese.....2.00 max	Nickel.....11.0-15.0
Sulphur.....0.030 max	Nitrogen.....3.0-4.0
Silicon.....0.75 max	* flat rolled products only

STAINLESS STEEL 321

High carbon steel prone more to intercrystalline attack in weld zones and slower cooling section. These steel avoids such attacks through its stabilization with Ti. The corrosion behaviour of this alloy in natural environments is very similar to the TP 304/304L alloys. Architecturally, it may not be adequate for near industrial or onshore location in Europe. Satisfactory in many low chloride waters, it is prone to pitting or crevice corrosion in seawater. water treatments, galvanic protection and deaearation can influence the performance.

STAINLESS STEEL 321H

This is the high carbon version of TP 321 which ensures great creep resistance. Behaves much the same as TP 321 in oxidation resiatanc. Main applications : Heat exchanger, furnaces, boilers in chemical and petrochemical plants.