

SS 304 / 304L / 304H

STAINLESS STEEL GRADE 304

IS THE STANDARD 18/8 (18% CHROME, 8% NICKEL) AUSTENITIC STAINLESS STEEL. IT IS A NON-MAGNETIC ALLOY IN THE ANNEALED CONDITION, HOWEVER, BECOMES MAGNETIC AS IT IS COLD WORKED. IT IS THE MOST ORDINARILY UTILIZED OF ALL STAINLESS GRADES. T304 CAN BE EFFORTLESSLY WELDED AND IS THE PREFERRED FOR MANY DEEP DRAWN, SPUN OR FORMED PARTS DUE TO ITS HIGH DUCTILITY.

STAINLESS STEEL GRADE 304L

HAS OXIDATION RESISTANCE TO A MAXIMUM TEMPERATURE OF 1650°F (899°C) CONTINUOUS WITHOUT CONSIDERABLE SCALING. THE MAXIMUM TEMPERATURE FOR INTERMITTENT PRESENTATION IS 1500°F (816°C). SINCE 304L IS AN ADDITIONAL LOW-CARBON VARIETY OF 304 IT CAN FREQUENTLY BE UTILIZED IN THE "AS-WELDED" CONDITION (WITHOUT ANNEALING), EVEN IN SEVERE CORROSIVE CONDITIONS, EXCEPT FOR APPLICATIONS INDICATING STRESS RELIEF. 304L HAS GOOD WELDING QUALITIES AND CAN BE WELDED BY ALL STANDARD STRATEGY; HOWEVER, CONSIDERATION SHOULD BE PAID TO MAINTAIN A STRATEGIC DISTANCE FROM WELD "HOT CRACKING". TO RELIEVE STRESS DURING SEVERE FORMING OR SPINNING WELDING MAY BE FOLLOWED BY ANNEALING.

STAINLESS STEEL GRADE 304H

INCLUDES A HIGH CARBON CONTENT MAKING THE STEEL MORE SUITABLE FOR UTILIZATION IN APPLICATIONS WHERE HIGH TEMPERATURES ARE AVAILABLE. THE BENEFIT OF THIS GRADE IS THAT IT IS AN AUSTENITIC CHROMIUM-NICKEL STEEL ALLOY AS WELL AS THE GREATER CARBON CONTENT DISTRIBUTE TO INCREASED TENSILE AND YIELD STRENGTH. THE MATERIAL IS RECOMMENDED FOR UTILIZING IN ASME PRESSURE VESSELS IN WORKING SERVICE ABOVE 525° C BECAUSE OF THE GRADE'S HEAT RESISTANT PROPERTIES.

APPLICATIONS

- AIR BAG SENSORS
- CLAMPS
- BELLOWS
- FLEXIBLE HOSES
- HINGES
- CRYOGENIC COMPONENTS
- SURGICAL INSTRUMENTS
- PRESSURE VESSELS
- OIL WELL FILTER SCREEN
- HYPODERMIC NEEDLES
- MEDICAL PARTS
- TUBING

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CHARACTERISTICS

- FORMING AND WELDING PROPERTIES
- CORROSION / OXIDATION RESISTANCE THANKS TO THE CHROMIUM CONTENT
- DEEP DRAWING QUALITY
- EXCELLENT TOUGHNESS, EVEN DOWN TO CRYOGENIC TEMPERATURES WHICH ARE DEFINED AS VERY LOW TEMPERATURES
- LOW TEMPERATURE PROPERTIES RESPONDING WELL TO HARDENING BY COLD WORKING
- EASE OF CLEANING, EASE OF FABRICATION, BEAUTY OF APPEARANCE
- EXCELLENT COMBINATION OF STRENGTH AND FABRICABILITY

CORROSION RESISTANCE

304 & 304L HAVE MAGNIFICENT RESISTANCE TO CORROSIVE ENVIRONMENT, FOR EXAMPLE TEXTILE, CHEMICAL AND PETROLEUM INDUSTRIES. THEY ARE FOUND SUITABLE IN DAIRY AND FOOD INDUSTRIES AS WELL AS PERFORM EXCEPTIONALLY WELL IN RURAL AND INDUSTRIAL ATMOSPHERIC EXPOSURE.

MACHINING

TO WORK HARDEN SLOW SPEEDS AND HEAVY FEEDS WILL MINIMIZE THIS ALLOY'S TENDENCY. BECAUSE OF LONG STRINGY CHIPS, THE UTILIZATION OF CHIPBREAKERS IS PRUDENT. MANY ORGANIZATIONS NOW OFFER PREMIUM MACHINABILITY GRADES, FOR EXAMPLE CARTECH WITH THEIR PROJECT 70 AND 7000 SERIES.

WELDING

ALL FUSION AND RESISTANCE PROCESS HAVE BEEN SUCCESSFULLY UTILIZED IN WELDING 304. AWS E/ER308 OR 312 FILLER METAL IS RECOMMENDED. MANY USERS CHOOSE 304L FOR CLEANER AND STRONGER WELDS WHICH HAVE A CONTROLLED LOW CARBON CONTENT DESIGNED TO REDUCE CARBIDE PRECIPITATION AT THE WELD BOUNDARIES.

HOT WORKING

FORGING, HEADING AND OTHER HOT WORKING SHOULD BE FOLLOWED UNIFORM HEATING TO RANGE BETWEEN 2100-2300 F (1149-1260 C). FAST COOLING IS NECESSARY TO ATTAIN MAXIMUM CORROSION RESISTANCE IN FINISHED PARTS

CHEMICAL PROPERTIES

Grade	C	N	Si	P	S	Cr	Mn	Ni	Fe
304	0.08 max	0.10 max	0.75 Max	0.045 Max	0.030 Max	18.0- 20.0	2.0 Max	8.0 - 10.5	Reminder
304L	0.03 max	0.10 max	0.75 Max	0.045 Max	0.030 Max	18.0- 20.0	2.0 Max	8.0 - 12.0	Reminder
304H	0.04 – 0.10	0.10 max	0.75 Max	0.045 Max	0.030 Max	18.0- 20.0	2.0 Max	8.0 - 12.0	Reminder

MECHANICAL PROPERTIES

Grade	Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
4	75	30	40
4L	70	25	40
304H	75	30	40

PHYSICAL PROPERTIES

Properties	Units	Temperature in °C
Density	8.03 g/cm ³	Room
Specific Heat	0.12 Kcal/kg.C	22°
Melting Range	1399-1454 C	-
Modulus of Elasticity	193 KN/mm ²	22°
Electrical Resistivity	72 μΩ.cm	Room
Coefficient of Expansion	16.9 μm/m °C	20-100°
Thermal Conductivity	16.2 W/m-°K	20°

ASTM SPECIFICATIONS

Pipe / Tube (SMLS)	Sheet / Plate	Bar	Forging	Fitting
A 213	A 240, A 666	A 276	A 182	A 403

AVAILABILITY

MANUFACTURING	RAW MATERIALS
Refractory anchors	Pipes
Fasteners	Tubes
Custom Machining	Bars
Custom Fabrication	Sheets
Piping / Spools	Plates
Stamped Parts	-
B/W Fittings	-
S/W Fittings	-
Flanges	-
Compression Fittings	-