

SS 446

STAINLESS STEEL 446 IS A HIGH CHROMIUM FERRITIC HEAT RESISTANT ALLOY WHICH INCLUDES MAGNIFICENT RESISTANCE TO OXIDATION, SULFIDATION AND OTHER FORMS OF HOT CORROSION. THIS GRADE IS MOST REGULARLY UTILIZED BETWEEN 1500 - 2100°F, DESPITE THE FACT THAT ITS HIGH TEMPERATURE STRENGTH IS ENTIRELY LOW. 446 IS THE ONLY HEAT RESISTANT ALLOY THAT WILL ENDURE MOLTEN COPPER AS WELL AS BRASS. SIMILARLY WITH OTHER HIGH CHROMIUM FERRITIC STAINLESS, 446 EMBRITTLES SEVERELY IN THE 700-1000°F TEMPERATURE RANGE (885°F EMBRITTLE MENT). STAINLESS STEEL 446 OUGHT NOT TO BE UTILIZED AS A PART OF THIS TEMPERATURE RANGE UNLESS ALMOST FINISH LOSS OF ROOM TEMPERATURE DUCTILITY MIGHT BE ENDURED. SIGMA PHASE EMBRITTLEMENT OCCURS UPON LONG TIME EXPOSURE WITHIN THE SCOPE OF 1000-1300°F. 446 HAVE A HIGH DUCTILE- TO- BRITTLE EFFECT TRANSITION TEMPERATURE. THEREFORE, SUCCESSFUL FORMING AND BENDING IS AIDED BY EDGE PREPARATION, LOW FORMING SPEEDS AND PREHEATING TO 250-400°F. ANNEALING, WHEN COMPULSORY SHOULD BE PERFORMED AT 1550-1650°F FOLLOWED BY FAST COOL. WELDING MAY BE PERFORMED BY STANDARD TECHNIQUES. PREHEATING AND POST HEATING TO 300-600°F IS USEFUL. AUSTENITIC WELD FILLERS, FOR EXAMPLE AWS E310 OR E312 ARE USUALLY RECOMMENDED FOR MAXIMIZED WELD DEPOSIT DUCTILITY.

APPLICATIONS

- NEUTRAL SALT POT ELECTRODES
- RECUPERATORS
- SPOUTS FOR CONVEYING MOLTEN COPPER ALLOYS
- COMBUSTION CHAMBERS
- FURNACE AND KILN LININGS
- STACK DAMPERS
- BOILER BAFFLES
- GLASS MOLDS
- SOOT BLOWERS
- X-RAY TUBE BASES
- OIL BURNER COMPONENTS
- ANNEALING BOXES
- INDUSTRIAL MUFFLERS
- FURNACE PARTS

CHARACTERISTICS

- OXIDATION RESISTANCE THROUGH 2000°F
- SULFIDATION RESISTANCE
- GOOD THERMAL CONDUCTIVITY
- RESISTANCE TO MOLTEN COPPER
- LOW STRENGTH
- GOOD RESISTANCE TO OXIDATION

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MACHINING

SLOW SPEEDS AS WELL AS POSITIVE FEEDS JOINED BY RIGID MOUNTS AND SHARP TOOLING SURFACES OPTIMIZE MACHINING 446.

WELDING

WITH THIS ALLOY MOST COMMON WELDING TECHNIQUE CAN BE SUCCESSFULLY UTILIZED. TYPE 308 WELDING MATERIAL MIGHT BE UTILIZED, HOWEVER, WON'T SHOW SCALING RESISTANCE EQUIVALENT TO THE BASE METAL. CONSIDERATION MUST BE GIVEN TO THE DISTINCTIONS IN COEFFICIENT OF THERMAL EXPANSION OF THE BASE AS WELL AS WELD METAL. OXYACETYLENE WELDING IS NOT RECOMMENDED.

HOT WORKING

HOT WORKING IS DONE AT 2000-2150 F. LAST, 10% OF THE WORK SHOULD BE PERFORMED BENEATH 1600 F FOR GRAIN REFINEMENT.

COLD WORKING

446 ARE TOUGHER THAN OTHER STAINLESS STEELS TO DRAW, BEND, SPIN AND WELD BECAUSE OF ITS ELEVATED CHROMIUM CONTENT.

ANNEALING

SOAK AT 1500 F AND WATER QUENCH. TRY NOT TO SURPASS 1650 F AT ANY TIME. SLOW COOLING BELOW 1200 F WILL RESULT IN THE LOSS OF DUCTILITY.

HARDENING

S.S 446 ALLOYS DOES NOT RESPOND TO HEAT TREATMENT.

CHEMICAL PROPERTIES

Grade	C	Si	P	S	Cr	Mn	Ni	N	Fe
SS 446	0.2 max	1 Max	0.04 Max	0.03 Max	23.0- 27.0	1.5 Max	0.75 Max	0.25 max	Reminder

MECHANICAL PROPERTIES

Grade	Tensile Strength (ksi)	0.2% Yield Strength (ksi)	Elongation% in 2 inches
SS 446	65	40	20

PHYSICAL PROPERTIES

Properties	Units	Temperature in C
Density	7.8 g/cm ³	Room
Specific Heat	0.12 Kcal/kg.C	22°
Melting Range	1448-1487 °C	-
Modulus of Elasticity	199.9 KN/mm ²	20°
Electrical Resistivity	402 μΩ.cm	Room
Coefficient of Expansion	10.4 μm/m °C	20-100°
Thermal Conductivity	21.6 W/m-°K	20°

ASTM SPECIFICATIONS

Pipe / Tube (SMLS)	Sheet / Plate	Bar	Forging	Fitting	Wire
A 268, A 511	A 176	A 276, A 314	A 473	A 815	A 580

AVAILABILITY

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