Duplex Stainless Steel
EN 1.4460 MAXIVAL®

A stainless austenitic-ferritic steel

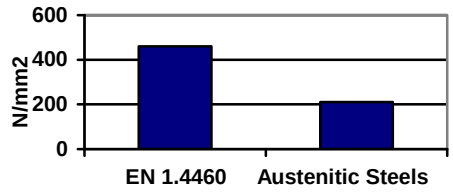
Typical analysis %	C 0,025	Cr 25,4	Ni 5,75	Mo 1,5
Delivery condition	Solution annealed			

Mechanical properties

Values for solution annealed condition to EN 10088 - 3

Tensile strength Rm	N/mm^2	620 - 880
Proof strength Rp_{02}	N/mm^2	min 460
Elongation A_5	%	min 20
Impact energy KV – RT	J/cm^2	Min 85
Hardness	HB	Max 260

Proof strength



Physical properties acc. to EN 10088

Temperature	20° C	100° C	200° C	300° C
Density kg/dm^3	7,8			
Modulus of elasticity GPa	200	194	186	180
Mean coeff. of thermal expansion 20° C –Temp. $x10^{-6} \cdot K^{-1}$	-	13,0	13,5	14,0
Specific Thermal Capacity $W/m \cdot K$	15			
Electrical Resistivity $\Omega \cdot mm^2/m$	0,75			
Specific heat $J/kg \cdot K$	500			

The steel is susceptible to embrittlement when applied in the temperature range of 300-900° C. Scaling temperature in air is approx. 1070° C.

EN 1.4460 MAXIVAL® is an acid resistant austenitc-ferritic steel that is charachterized by:

⇒ Excellent resistance to pitting corrosion, crevice corrosion, stress corrosion and corrosion fatigue
⇒ High strength
⇒ Excellent machinability
⇒ High toughness

Typical application areas

- Propeller shafting
- Pump shafting
- Pump parts
- Valve parts
- Pistons
- Spindles
- Stirrers
- Bolting
- Nuts

Corrosion resistance

EN 1.4460 shows very good corrosion resistance particularly in chloride-bearing environments. Its resistance to chloride caused attacks such as pitting, crevice corrsion, stress corrosion and corrosion fatigue is much better than that of fully austenitic stainless steels of EN 1.4404 type. Also in most cases **EN 1.4460** is much better than EN 1.4404 type with regard to general corrosion resistance in reducing and oxidizing acids. Besides the two-phase microstructure and the low carbon content render **EN 1.4460** better resistance to intercrystalline corrosion after sensitisation within the temperature interval 500 - 900° C.
When extremely high demands are imposed on resistance to pitting and crevice corrosion it is recommended that machining of the steel surface be followed by pickling or passivation.

Heat treatment

Solution annealing 1020 - 1100ºC. Holding time at solution annealing temperature approx. 30 min, followed by rapid cooling in water. Stress relief treatments can in special cases be performed at 550ºC - 600ºC.

Fabrication

Hot and cold forming

Hot forming should be carried out in the temperature range 1200-950˚C. It should however, be observed that the strength of the duplex material is low at high temperatures.
Hot working should normally be followed by solution annealing.

Due to the high proof strength of duplex material, greater working forces than those required for austenitic steel are usually needed for cold forming of duplex steel. The spring back is relatively high because of the high yield point. Solution annealing is normally recommended after more than 10 % cold deformation.

Machining

EN 1.4460 MAXIVAL® is a machinability improved Duplex stainless steel, which has considerably better machinability properties then EN 1.4462 It is not a " stainless free cutting steel " but a high class norm steel.
It is an " easy to machine steel", considered for parts where extensive machining is required.

Welding

EN 1.4460 possesses good weldability and can be welded in the same manner as austenitic material. Welding should be carried out without preheating and with small weld beads, i.e. with as little heat supply as possible.
It is not necessary to use welding consumables of the same steel grade but also austenititic ones can be used.

Welding of **EN 1.4460** and subsequnt application in highly corrosive environments could lead to to a reduction in corrosion resistance. After annealing at 980˚ C and quenching in water the corrosion resistance of the weld will be just as high as that of the base material.

Bar finish

EN 1.4460 is available with a machined or ground surface.

Stock standard

Please refer to products stock standard:
www.valbrunanordic.se

Technical service

VALBRUNA NORDIC AB will be helpful in giving further advise and recommendations concerning choice of materials, welding, heat treatment etc.

MATERIAL STANDARDS

SS-EN 10088-3	Stainless steels-Semi-finished products, bars, rods, sections for general purposes
ASTM A 276/ ASME SA-276	Stainless steel bars for general purposes