SÜDWESTFALEN
Edelstahlwerke Südwestfalen GmbH

C: **max. 0,04**
Cr: **16,0 - 18,0**
Ni: **12,0 – 14,0**
Mo: **2,0 – 3,0**
N: **0,10 – 0,18**
B: **0,0015 – 0,0050**

1.4910
X3CrNiMoBN 17-13-3

1.4910

High temperature resistant, chromium, nickel, molybdenum, nitrogen and boron containing austenitic stainless steel.

Relevant current and obsolete standards:
- EN 10269 : 1.4910 X3CrNiMoBN 17-13-3
- AISI :
- BS :
- JIS :
- AFNOR :
- DIN : 1.4910

General properties

– corrosion resistance	: very good
– mechanical properties	: good
– forgeability	: good
– weldability	: excellent
– machinability	: average

Special properties

- non-magnetic grade ($\mu_r \leq 1{,}10$)
- resistant to scaling up to around 700 °C

Physical Properties

– density (kg/dm^3)	: 8,0
– electrical resistivity at 20°C (Ω mm^2/m)	: 0,77
– magnetisable	: no
– thermal conductivity at 20°C (W/m K)	: 16
– specific heat capacity at 20°C (J/kg K)	: 450
– thermal expansion ($10^{-6}K^{-1}$)	
between 20 and 100°C	: 16,3
20 and 200°C	: 16,9
20 and 300°C	: 17,3
20 and 400°C	: 17,6
20 and 500°C	: 18,2
20 and 500°C	: 18,5

Typical applications

- automotive industry
- chemical industry
- pressure vessels and boilers
- turbines

Processing properties

– automated machining	: seldom
– machinable	: average
– hammer and die forging	: yes
– cold forming	: yes
– cold heading	: seldom
– suited to polishing	: yes

Finished product forms and conditions

- wire rod ∅ 6 - 19
- peeled bars ∅ 21 - 75
- bright bar h9, h11 ∅ 21 – 75
- solution annealed and quenched
- direct quenched
- pickled
- drawn
- straightened
- peeled
- ground

Demand tendency ↗

1.4910 is similar to the high temperature resistant version of the stainless steel grade, **1.4429**. This grade of steel owes its high temperature properties to the boron addition, which prevents grain growth upon exposure to elevated temperatures and as such maintains the mechanical properties for longer periods of time, i.e. creep properties. Due to the addition of nitrogen, **1.4910** displays better high temperature strength and creep resistance properties than **1.919**.

Revision No. 4910-0
Created: 03.05.2001

Properties, applications and processing

Corrosion resistance (PRE = 24,2 to 30,76)

Although **1.4910** is primarily a high temperature resistant grade, the high alloy content also results in excellent resistance to aqueous corrosion in most natural waters (urban, rural and industrial), even at moderate chloride and salt contents. This grade of stainless steel is also resistant to corrosion in various acid environments. From a corrosion resistance point of view, **1.4910** has similar properties to **1.4435**.

Due to its low carbon content, **1.4910** is resistant to intergranular corrosion in both the delivered and welded conditions. Please note that **1.4910** is not resistant to sea water at elevated temperatures.

Heat treatment / mechanical properties

Optimal mechanical and fabrication properties are realised after solution annealing in the temperature range 1020 - 1100°C followed by rapid cooling in air or water.

In the solution annealed condition, the following mechanical properties may be attained when testing in the longitudinal direction:

Property	Specification	Typical
- yield strength (N/mm^2)	$R_{p0,2}$: ≥ 260	475
- tensile strength (N/mm^2)	R_m : 550 – 750	715
- tensile elongation (%)	A_5 : ≥ 35	39
- impact energy (J) @ 25°C	ISO-V : ≥ 100	> 300

Weldability

1.4910 is readily weldable using all welding processes. Should a filler material be required, **Novonit® 4430**, can be used. Pre-heating is not required and the maximum interpass temperature should not exceed 150°C. Heat treatment after welding is not necessary.

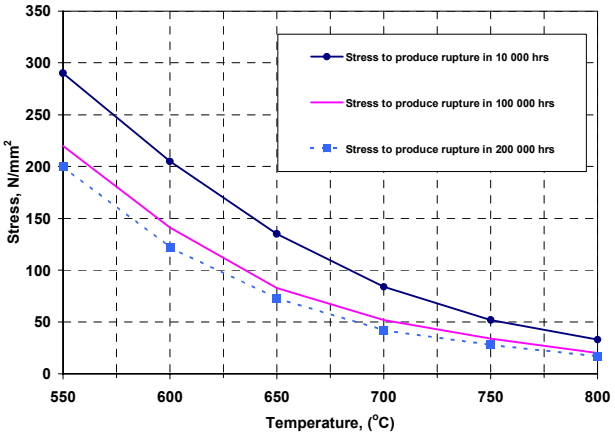
Should the possibility exist that the weldment could be exposed to aqueous corrosion conditions, then any scale or heat tint that results from welding or high temperature processing must either be mechanically or chemically removed and a suitable passivating treatment must be carried out to restore the corrosion resistance.

Forging

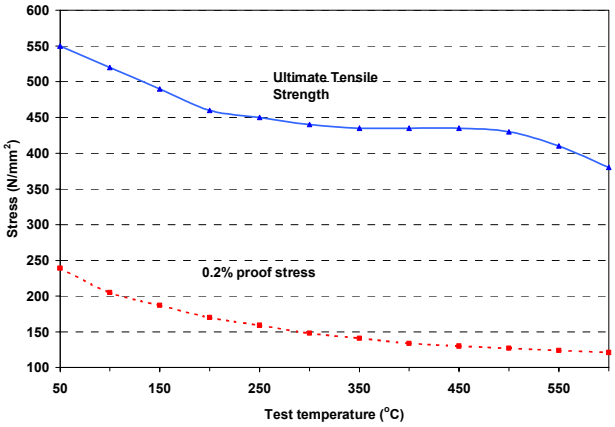
Work pieces are usually pre-heated to between 1150 - 1200°C with forging taking place between 1200 and 900°C. After forging, the forged component must be rapidly cooled in either air or water to avoid the formation of any undesirable phases which might adversely affect the corrosion and/or mechanical properties.

Elevated temperature properties

The temperature-stress-time relationships, presented below indicate the minimum creep properties to be expected for **1.4910**.



The following minimum tensile properties for **1.4910** in the annealed condition, at various temperatures are specified in the EN 10269 : 1999 standard.



Machining

As a result of its higher alloy content, especially due to the addition of nitrogen, **1.4910** is more difficult to machine than less highly alloyed stainless steels. In addition to this, rapid work hardening and poor thermal conductivity require the use of adequate cooling and high quality cutting/machining tools. When machining **1.4910**, the following cutting parameters can be used as a guideline when using coated hard metal cutting tools.

tensile strengths R_m in N/mm^2	depth of cut (mm) feed (mm/rev)		
	6 mm 0,5 mm/r	3 mm 0,4 mm/r	1 mm 0,2 mm/r
solution annealed (560 - 640)	100 m/min	125 m/min	165 m/min

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