Technical Data Sheet
AISI-410S

General Presentation

AISI-410S is a low carbon, non-hardening variant of AISI-410, a 12% chromium martensitic stainless steel. The low carbon content and a small alloy addition reduce austenite formation at high temperatures, limiting the alloy's ability to harden. Even when rapidly cooled from above the critical temperature, AISI-410S remains soft and ductile. This non-hardening property aids in the prevention of cracking when the alloy is subjected to high temperatures or welded. In the annealed state, AISI-410S is completely ferritic. It has adequate corrosion resistance, comparable to AISI-410, as well as good oxidation resistance.

Classification

Ferritic stainless steel

Application

It is widely used in petroleum refining and petrochemical processing, ore processing, thermal processing, gate valves and press plates.

Processing

Heat treatment cannot harden the alloy. It is annealed between 871 and 899°C before being air cooled to relieve cold working stresses. Due to embrittlement, AISI-410S should not be exposed to temperatures of 1100°C or higher. If too many large grains form after annealing mildly cold-worked material, the annealing temperature should be reduced to 649 - 732°C.

Forming

AISI-410S stainless steel is easily formed by spinning, bending, and roll forming.

Weldability

AISI-410S is generally thought to be weldable using standard fusion and resistance techniques. Brittle weld fractures should be avoided during fabrication by minimizing discontinuities, maintaining low weld heat input, and occasionally warming the part slightly before forming.

AISI-410S is thought to be slightly less weldable than the most common ferritic stainless steel grade, AISI-409. The alloy addition to control hardening causes a significant difference, requiring more heat input to achieve penetration during arc welding. AWS E/ER 309L or 430 filler material is most commonly specified when a weld filler is required.

Corrosion

It is resistant to corrosion in air, fresh water, mild organic and mineral acids, alkalis, and some chemicals. When proper cleaning is performed after exposure to use, it's exposure to chlorides in everyday activities (e.g., food preparation, sports activities, etc.) is generally satisfactory.

Chemical Properties

Chemical properties of the alloy is given below (maximum values unless indicated otherwise).

Name	Number	C (%)	Si (%)	Mn (%)	P (%)	S (%)	Cr (%)	Ni (%)	N (%)
X6Cr13	1.4000	0,080	1,00	1,00	0,040	0,015	12,0 to 14,0	-	-

Mechanical Properties

The following table summarizes the mechanical properties at room temperature (minimum values).

Tensile S. (MPa), Rm	Yield S. (MPa), Rp 0,2	Elongation (%)	Elastic Modulus (GPa)
400-600	240	19	220

Some Physical Properties

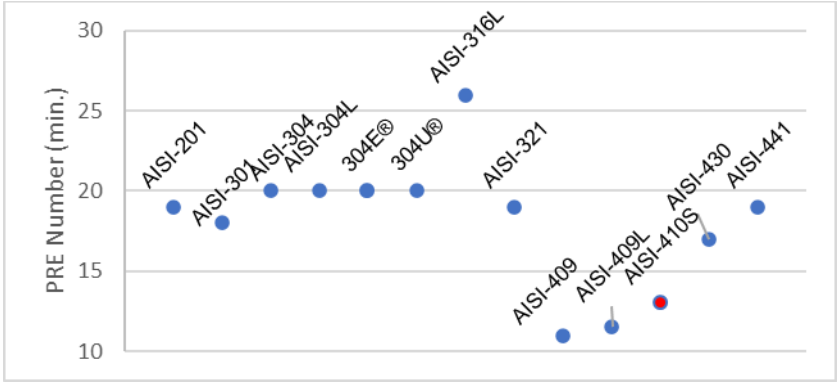
Thermal conductivity at 20 °C (W/(m.K)	Specific thermal capacity at 20 C° J/(kg.K)	Electrical resistivity at 20 °C (Ω.mm2/m)
30	460	0,60

Comparison With Different Stainless Steel Grades

	AISI-409	AISI-409L	AISI-410S
% C + N	0.030	0.030	0,08
% Cr min. / max.	10.5 / 12.5	10.5 / 12.5	12.0 / 14.0
% Mo min. / max.	-	-	-

Corrosion Resistance

PRE value of each alloy is given on the graph below. AISI-410S is indicated with red dot on graph.



Avalaible Products

Process	Alloy Type	Alloy (AISI)	EN No.	Surface	Product Type	Range		
						thickness (mm)	width (mm)	length (cm)
Cold rolled + Solution annealed	Austenitic	201	1.4372	2B, 2D, 2H, 2J, 2C, NO:4, SB	Coil, strip, sheet, plate, disc	0,25-3	50-1300	20-600 or coil
		301	1.4310					
		304/304L	1.4301/1.4307					
		304E®/304U®	-					
		316L	1.4404					
		321	1.4541					
	Ferritic	409/409L	1.4512					
		410S	1.4000					
		430	1.4016					
		441	1.4509					

Geometrical Properties

The tolerances of thickness according to TS EN ISO 9445-2 Standard is given below (dimensions in milimeters).

Specified thickness	Special tolerances for a specified width of	
(t)	w ≤ 1000	1000 < w ≤ 1300
t < 0,30	±0,030	-
0,30 ≤ t < 0,40	±0,030	±0,035
0,40 ≤ t < 0,50	±0,035	±0,035
0,50 ≤ t < 0,60	±0,035	±0,035
0,60 ≤ t < 0,80	±0,040	±0,040
0,80 ≤ t < 1,00	±0,040	±0,050
1,00 ≤ t < 1,20	±0,050	±0,055
1,20 ≤ t < 1,50	±0,055	±0,060
1,50 ≤ t < 2,00	±0,065	±0,070
2,00 ≤ t < 2,50	-	-
2,50 ≤ t < 3,00	-	-

The tolerances on width for cold-rolled wide strip and sheet/plate cut from cold-rolled wide strip mill edges is given below (dimensions in milimeters).

Tolerances for a specified width of	
600 ≤ w < 1000	1000 ≤ w ≤ 2100
+25 0	+30 0

The tolerances on sheet-plate cut from cold-rolled wide strip mill edges is given below (dimensions in milimeters).

Tolerance	
Length	Normal
≤ 1500	+5 /0

- For thickness tolerances, EN/2 is in our productibility.
- The width tolerances are for slit edge materials.

Edge Wave, Flatness Tolerances

- According to standard h/l rate is 0.03 max.
- For clients with special requests on flatness we can produce EN/2.

Sheet/plate

- Minimum sheet length is 200 mm, maximum sheet length is 6000 mm.
- Minimum width is 425 mm, maximum width is 1300 (1500 mm is avalaible for contract manufacturing).
- Producible thicknesses are between 0,3 – 3 mm.
- The above mentioned min. and max. Values are machine manufacturability. Information should be obtained from planning for plate combinations.
- Sheets can be filmed.
- Sheets can be labeled.

Mandrel Dia. (mm)	Thickness (mm)		Width (mm)		Length (cm)		Mandrel Tonnage	Packet Tonnage
Entry	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Max.
503	0,5	3	425	1500	20	600	10	2,5

Strip

- Strip inner diameter is 508 mm.
- For thicknesses of 0.90 mm and above, the slitting process is combined as 50 mm*15mm. The strip outer diameter is a maximum of 1750 mm.
- For thicknesses below 0.90 mm, the slitting process is combined as 50 mm * 15 mm. Maximum roll weight should be 10 tons.
- Slitting is not performed in thicknesses below 0.30 mm thickness.
- Paper wrapping is not possible for strips under 350 mm width.
- For thicknesses over 1.80 mm, the slitting process should be asked to the planning department.
- Thin film coating can be done on the edge cutting.
- It is possible to label on the edge cut rolls.

Cutting Type	Mandrel Dia. (mm)		Thickness (mm)		Width (mm)	
	Entry	Exit	Min.	Max.	Min.	Max.
Edge Cutting	508 - 610	508 - 610	0,3	3	300	1280
Multi Slitting	508 - 610	508 - 610	0,6	3	40	-

Subjected Certificates and Standards

Certificates:

- TS EN ISO 9001:2015
- TS EN ISO/IEC 17025:2017
- TS EN ISO 9001:2015 EN AS 9100:2018
- IATF 16949:2016
- TS ISO 10002:2018
- 2014/68/EU: EN 764-5, section 4.2 and AD 2000-Merkblatt W0
- TS EN 10088-2:2014,
- 2001/95/EC General Product Safety Directive
- 1935/2004 EU Food Contact Regulations (EC)
- 98/79/EC In Vitro Diagnostics Medical Devices and Repealing Directive
- EU 2017/745 Medical Devices
- EU NO 305/2011 Construction Products Regulation
- 2011/65/EU Restriction of Hazardous Substances Directive ROHS
- 2016/26/EU, 2017/225/EU, 2018/35/EU REACH
- 2014/34/EU ATEX

Standards:

- TS EN 10088-2:2014,
- TS EN 10088-4:2013,
- TS EN 9445-2:2010,
- TS EN 10028-7:2016,
- TS 3157 EN ISO 3651-2:2000,
- ASTM A240/A240M-22b-2022,
- ASTM A480/A480M-22a-2022,
- ASME SA 240/SA 240M-2021,
- ASME SA 480/SA 480M-2021,
- ASTM A262,
- EN 764-5 Section 4.2,
- ISPM 15:2019 Fumigation

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