

<b>Quality</b>	<b>X15CrNiSi25-21</b>	<b>Austenitic</b>	<i>Technical card 2018</i>
Number	<b>1.4841</b>	<b>Stainless Steel</b> (refractory steel)	<i>Lucefin Group</i>

### Chemical composition

C%	Si%	Mn%	P%	S%	Cr%	Ni%	N%	
max		max	max	max			max	
0,20	1,50-2,50	2,00	0,045	0,015	24,0-26,0	19,0-22,0	0,10	EN 10088-1: 2014
+ 0.01	+ 0.10	+ 0.10	+ 0.005	+ 0.003	± 0.25	± 0.15	+ 0.01	

Product deviations are allowed

### Temperature °C

Melting range	Hot-forming	Solution annealing +AT	Soft annealing +A	Stabilizing	MMA welding – AWS electrodes
1430-1400	1190-1000	1150-1050 water	not suitable	not necessary	<i>pre-heating</i> not necessary
					<i>post weldin</i> solution annealing
Sensitization	Quenching +Q	Tempering +T	Stress relieving +SR	joint with steel	
avoid slow heating in the range of 600 and 900	not suitable	not suitable	650 air	carbon	CrMo stainless
				E309-E308	E309-E308 E310
				cosmetic welding	E312

**Chemical treatment** - Pickling (6 - 25% HNO<sub>3</sub>) + (0.5 - 8% HF) hot or cold. Passivation 20 - 25% HNO<sub>3</sub> hot

### Mechanical properties

**Products obtained with plastic deformation** EN 10095: 2001

bar size		Testing at room temperature						
mm		R <sup>1)</sup>	Rp 0.2	A% min for products			HBW <sup>1)</sup>	
from	to	N/mm <sup>2</sup> min	N/mm <sup>2</sup> min	long	flat		max	
	160	550-750	230	(l)	da 0,5 a < 3 (l) (tr)	≥ 3 (l) (tr)	223 +AT solution annealing	
				30	28	30		

<sup>1)</sup> The max HB values may be raised by 100 units or the max tensile strength value may be raised by 200 N/mm<sup>2</sup> and the min elongation value be lowered to 20% for section and bars of ≤ 35 mm thickness having a final cold deformation.

(l) = longitudinal (tr) = transversal

**Forged** +AT solubilized material ASTM A 473-99

ssize		Testing at room temperature						
mm		R	Rp 0.2	A%	Z%	Kv +20 °C	Kv +20 °C	Kv -196 °C
from	to	N/mm <sup>2</sup> min	N/mm <sup>2</sup> min	min (L)	min (L)	J min (L)	J min (T)	J min (T)
		515	205	40	50	-	-	-

**Hard-drawn** ASTM A 276-04 (+AT+C)

size		Testing at room temperature			
mm		R	Rp 0.2	A%	Z%
from	to	N/mm <sup>2</sup> min	N/mm <sup>2</sup> min	min	min
	12.7	620	310	30	40
	12.7	515	205	30	40

**Creep properties** EN 10095 : 2001. Estimated average value of the strength for 1% (Rp<sub>1,0</sub>) elongation and estimated average value of the strength for rupture (Rm) at elevated temperature for 1 000 h, 10 000 h and 100 000 h.

Test temperature °C	Strength elongation Rp <sub>1,0</sub> N/mm <sup>2</sup>			Strength rupture R N/mm <sup>2</sup>		
	1000 hours	10.000 hours	100.000 hours	1000 hours	10.000 hours	100.000 hours
<b>600</b>	105	95		170	130	80
<b>700</b>	50	35		90	40	18
<b>800</b>	23	10		45	20	7
<b>900</b>	10	4		20	10	3
<b>1000</b>	3	-		5	-	-

Transition-curve determined with Kv. Solubilized material at 1050 °C

Average J	60	70	85	100	120	150	170
Test at °C	-160	-120	-80	-40	0	40	80

Approximate values at high temperatures. Material +AT solubilized at 1050 °C

R	N/mm <sup>2</sup>	630	610	580	560	520	460	400	300
Rp 0.2	N/mm <sup>2</sup>	290	240	200	190	180	170	150	140
A	%	46	42	40	40	38	34	25	22
C	%	72	70	68	62	58	40	28	38
Test at °C		100	200	300	400	500	600	700	800

Thermal expansion	10 <sup>-6</sup> • K <sup>-1</sup>	▶	15.5	17.0	17.5	18.0	19.0
Modulus of elasticity	longitudinal GPa	200	184	167	150	135	
Poisson number	ν	0.30 ~					
Electrical resistivity	Ω • mm <sup>2</sup> /m	0.90					
Electrical conductiv.	Siemens•m/mm <sup>2</sup>	1.11					
Specific heat	J/(Kg•K)	500					
Density	Kg/dm <sup>3</sup>	7.90					
Thermal conductivity	W/(m•K)	15					
Relative magnetic permeability	μr max	1.02					

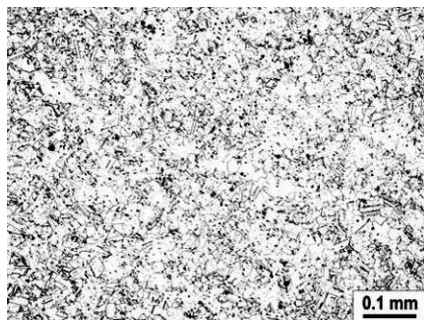
°C 20 100 200 300 400 500 600 800 1000  
 The symbol ▶ indicates temperature between 20 °C and 200 °C, 20 °C and 400 °C .....

Corrosion resistance	Atmospheric		Chemical			x radiant tubes, boiler, heat treating boxes
	Fresh water	<i>industrial</i> <i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x	x	x	x	x		

Magnetic no  
 Machinability mean  
 Hardening by cold-drawn and and other cold plastic deformations  
 Service temperature max 1125 °C

Europe	USA	USA	China	Russia	Japan	India	R. of Korea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X15CrNiSi25-21	S31400	314	1Cr25Ni20Si2	20Ch25N20S2	SUH 310 ~	X20Cr25Ni20	STS 310 TB ~

Solubilized material at 1100 °C and cooled in air. Structure: carbides within austenite matrix



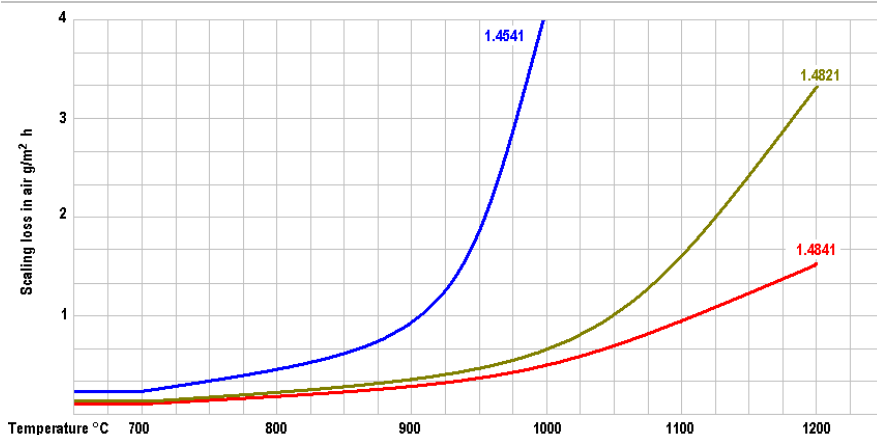
x100



x200



x500



Scaling loss in air