TRAFITECH

Quality	**X8CrNi25-21**	**Austenitic Stainless Steel** (refractory steel)	*Technical card 2018*
Number	**1.4845**		*Lucefin Group*

Chemical composition

C% max	**Si%** max	**Mn%** max	**P%** max	**S%** max	**Cr%**	**Ni%**	**N%** max	
0,10	1,50	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**
1450-1400	1175-990 water	1150-1040 water	not suitable	not necessary
Sensitization	**Quenching +Q**	**Tempering +T**	**Stress relieving +SR**	
avoid slow heating in the range of 600 and 900	not suitable	not suitable	after hard-drawn 1080-1050 water 400-200 air	

MMA **welding –** AWS electrodes

pre-heating: not necessary

post weldin: solution annealing

joint with steel

carbon	CrMo alloyed	stainless
ENiCrFe-3	ENiCrFe-3	E310Nb

cosmetic welding: E310

Chemical treatment ▪ *Pickling* (10% HNO_3) + (0.5 – 1.5% HF) hot or cold. *Passivation* 20 - 45% HNO_3 cold

Mechanical properties

Products obtained with plastic deformation EN 10095: 2001

flat size		Testing at room temperature						
mm		**R**	**Rp** 0.2	**A**%	**Z%**	**Kv**$_2$ +20 °C	**HBW**	
from	to	N/mm² min	N/mm² min	min	min	J min	max	
	75	500-700	210	35	-	-	192	+AT solution annealing
	35	500-900	210	20	-	-	292	+AT+C

Forged +AT solubilized material ASTM A 473-17a

size		Testing at room temperature						
mm		**R**	**Rp** 0.2	**A**%	**Z**%	**Kv** +20 °C	**Kv** +20 °C	**Kv** -196 °C
from	to	N/mm² min	N/mm² 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/mm² min	N/mm² 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% ($Rp_{1,0}$) 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	Strength elongation **Rp** $_{1.0}$ N/mm²			Strength rupture **R** N/mm²		
°C	1000 hours	10.000 h.	100.000 h.	1000 h.	10.000 h.	100.000 h.
600	100	90	-	170	130	80
700	45	30	-	80	40	18
800	18	10	-	35	18	7
900	10	4	-	15	8.5	3

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

Average **J**	50	62	84	106	130	150	170
Test at **°C**	**-160**	**-120**	**-80**	**-40**	**0**	**40**	**80**

X8CrNi25-21 **n° 1.4845** austenitic *Lucefin Group*

Effect of **cold-working** (hot-rolled +AT+C). Approximate values

R	N/mm²	600	760	880	990	1080	1150	1220	1260
Rp 0.2	N/mm²	310	460	690	880	990	1040	1080	1100
A	%	42	30	18	8	6	6	5	5
Reduct.	**%**	**0**	**10**	**20**	**30**	**40**	**50**	**60**	**70**

Relative magnetic permeability μr as a function of magnetic field intensity and reduction. Approximate values

Reduction %	**0**	**14,7**	**26,8**	**64,2**	
Magnetic field intensity 4000 A/m	1.0018	1.0016	1.0018	1.0019	
Magnetic field intensity 16000 A/m	1.0035	1.0041	1.0043	1.0041	

Mechanical properties on various temperatures. Material +AT solubilized at 1050 °C. Approximate values

R	N/mm²	1223	1085	658	620	600	580	550	520	440	380	240
Rp 0.2	N/mm²	796	585	310	280	230	200	190	180	170	160	150
A	%	52	54	60	44	42	40	40	40	38	28	20
C	%	50	54	65	70	68	66	62	58	40	28	38
Test at	**°C**	**-254**	**-195**	**24**	**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**

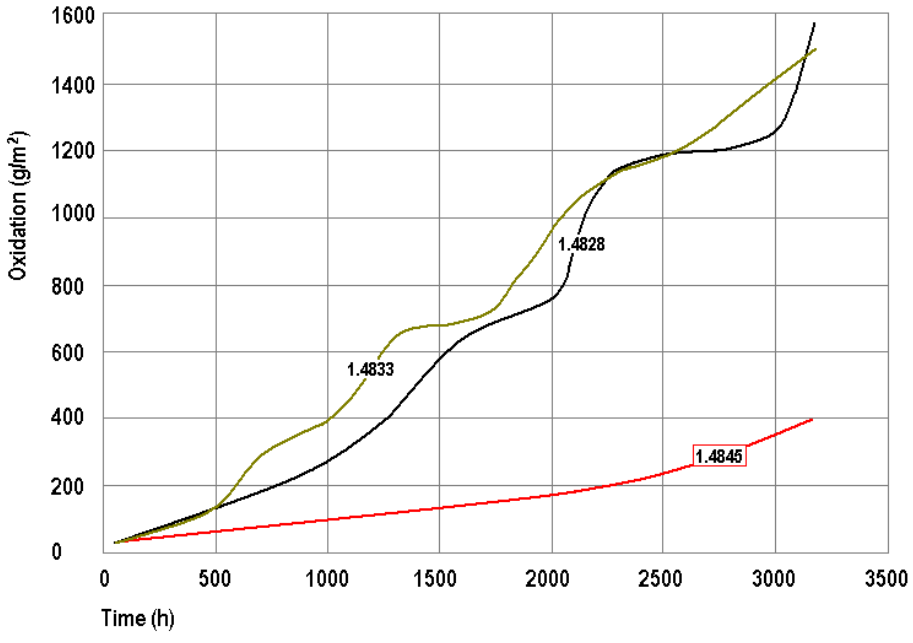
Thermal expansion	$10^{-6} \cdot K^{-1}$	►		15.5		17.0		17.5	18.5	19.0
Modulus of elasticity	longitudinal GPa	200	190	185	180	170	158	150	130	120
Poisson number	*v*	0.29 ~								
Electrical resistivity	Ω • mm²/m	0.85								
Electrical conductiv.	Siemens•m/mm²	1.18								
Specific heat	J/(Kg•K)	500								
Density	Kg/dm³	7.90								
Thermal conductivity	W/(m•K)	15					19			
Relative magnetic permeability	μr max	1.008								
°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**oil pumping station, hig-heat salt bath, hot gases> 550 °C
Fresh water	*industrial*	*marine*	*medium*	*oxidizing*	*reducing*	
x	**x**	**x**	**x**	**x**		

Magnetic	no
Machinability	high
Hardening	by cold-drawn and and other cold plastic deformations
Service temperature in air	continuous service up to 1050 °C; intermittent service up to 1000 °C

Europe EN	**USA** UNS	**USA** ASTM	**China** GB	**Russia** GOST	**Japan** JIS	**India** IS	**R. of Korea** KS
X8CrNi25-21	S31008	**310S**	0Cr25Ni20	10Ch23N18	SUH 310	10Cr25Ni18 ~	STS 310S



Oxidation at 1100 °C

When a material is exposed to an oxidizing environment at elevated temperatures, a more or less protective oxide layer will be formed on its surface. Even if oxidation is seldom the primary cause of high-temperature corrosion failures, the oxidation behaviour is important, because the properties of the oxide layer will determine the resistance to attack by other aggressive elements in the environment.The oxide growth rate increases with increasing temperature until the rate of oxidation becomes unacceptably high or until the oxide layer begins to crack and spall off, i.e. the scaling temperature is reached.

Outo Kumpu High Temperature Austenitic Stainless Steel