Quality	**(X20Cr13 ~)**	**Martensitic Stainless Steel**	*Technical card 2018*
Number	**1.4021 Medical**		*Lucefin Group*

Chemical composition

C%	Si% max	Mn% max	P% max	S% max	Cr%	
0,17-0,20	1,00	1,00	0,040	0,010	12,5-13,5	*(EN 10088-3: 2014)*
± 0.01	+ 0.05	+ 0.03	+ 0.005	+ 0.003	± 0.15	

Product deviations are allowed

Temperature °C

Melting range	Hot-forming	Subcritical annealing	Soft annealing +A	Full annealing
1510-1460	1100-830	770-720 air	825-745 air	900-840
Isothermal annealing +I	**Quenching +Q**	**Tempering +T**	**Stress-relieving +SR**	
-	1050-950 oil / polymer air	750-650 air	200-180 air	

MMA **welding –** AWS electrodes

pre-heating	*annealing after w.*
250-200	750

joint with steel

carbon	CrMo alloyed	stainless
E60 xx	E8018-B 2	E309

cosmetic welding
E420 – E410

Chemical treatment ▪ *Pickling* (10 - 15% HNO_3)+ (0,5-1,5% HF) hot or cold

Mechanical properties

Heat-treated material *(For reference EN 10088-3: 2014 in conditions 1C, 1E, 1D, 1X, 1G, 2D)*

size		Testing at room temperature					
mm		**R**	**Rp** 0.2	**A%**	**Kv_2** +20 °C	**HBW** a)	a) for information only
from	to	N/mm^2	N/mm^2 min	min	J min	max	
		760 max	-	-	-	230	+A annealed
	160	700-850	500	13	25	-	+QT700 quenched and tempered
	160	800-950	600	12	20	-	+QT800 quenched and tempered

Bright bars of heat-treated material *(For reference EN 10088-3: 2014 in conditions 2H, 2B, 2G, 2P)*

size		Testing at room temperature							
mm		**R**	**HBW** a)		**R**	**Rp** 0.2	**A%**	**Kv_2** +20 °C
from	to	N/mm^2 max	max		N/mm^2	N/mm^2 min	min	J min
	10 b)	910	290		750-1000	600	8	-
10	16	910	290		750-1000	550	8	-
16	40	850	260		700-950	500	10	25
40	63	800	250		700-900	500	12	25
63	160	760	230		700-850	500	13	25
		+A annealed material			+QT700 quenched and tempered material			

a) for information only

b) in the range of 1 mm ≤ d < 5 mm, values are valid only for rounds – the mechanical properties of non round bars of < 5 mm of thickness have to be agreed at the time of request and order

Thermal expansion	$10^{-6} \cdot K^{-1}$	►	10.3		10.8		11.7	12.2
Modulus of elasticity	longitudinale GPa	200						
Electrical resistivity	$\Omega \cdot mm^2/m$	0.55						
Electrical conductiv.	$Siemens \cdot m/mm^2$	1.80						
Specific heat	J/(Kg•K)		460					
Density	Kg/dm^3	7.75						
Thermal conductivity	W/(m•K)		25					
°C		**20**	**100**	**200**	**300**	**400**	**500**	**600**

The symbol ► indicates temperatures between 20 °C and 100 °C, 20 °C and 200 °C …..

Magnetic	yes
Machinability	good
Hardening	by quenching
Service temperature in air	up to 650 °C

Europe EN	**USA** UNS	**USA** ASTM	**China** GB	**Russia** GOST	**Japan** JIS	**India** IS	**Republic of Korea** KS
X20Cr13 ~							