Quality	**20NiCrMo2-2**	**Case-hardening Steel**	*Technical card*
According to standards	**ISO 683-3 : 2018**		***Lucefin Group***
Number	**1.6523**		*rev. 2018*

Chemical composition

C%	**Si%**	**Mn%**	**P%** max	**S%** max	**Cr%**	**Mo%**	**Ni%**	**Cu%** max	
0,17-0,23	0,15-0,40	0,65-0,95	0,025	0,035	0,35-0,70	0,15-0,25	0,40-0,70	0,40	Product deviations are allowed
± 0.02	± 0.03	± 0.04	+ 0.005	± 0.005	± 0.05	± 0.03	± 0.03	+ 0.05	

20NiCrMoS2-2 n° 1.6526 S% 0.020-0.040 product deviation ± 0.005%
On request, this steel garde may be supplied with addition of lead (Pb) 0.15-0.35%

Temperature °C

Hot-forming	**Natural state +U**	**Normalizing +N**	**Core hardening**	**Carburizing**	**Hardening carburizing surf.**	**Str-reliev. +SR**
1100-900	(HB max 230)	880-900 air	860-900 oil-polymer salt bath	880-980	800-830 oil-polymer salt bath	150 200

Soft annealing +A	**Isothermal annealing +I**	**Annealing +FP**	**End quench hardenability test**	**Pre-heating welding**		**Stress-relieving after welding**
				welding must be carried out on the annealed state and before carburizing		
700 furnace cooling 10 °C/h to 600, then air (HB max 212)	850 furnace cooling to 650, then air (HB 161-212)	950-1000 quick cooling (HB 149-194)	900 water	150-350		600 furnace cooling
				Ac_1	**Ac_3**	**Ms** * core ** carburizing surface
				735	820	380* 200**

Mechanical properties

Hot-rolled values obtained on test blanks after core hardening + stress-relieving UNI 7846: 1978. Use only as reference

size mm test blanks	Testing at room temperature (longitudinal) **R** N/mm²	**Rp** 0.2 N/mm² min.	**A%** min.	**Kcu** J min.	***HB***	
11	1180-1570	930	7	27.5	*354-438*	
30	830-1130	590	10	30	*249-339*	for information only
63	690-980	490	11	30	*210-295*	for information only

Table of tempering values obtained at room temperature on rounds of Ø 10 mm after quenching at 860 °C in oil

HB		415	409	409	404	390	385	376	357	344	319	294	264	240	213
HRC		44.5	44	44	43.5	42	41.5	40.5	38.5	37	34	31	27	22.5	-
R	N/mm²	1440	1430	1425	1410	1340	1335	1270	1200	1140	1050	975	885	800	700
Rp 0.2	N/mm²	1060	1110	1160	1180	1180	1170	1135	1080	1025	950	870	785	700	600
A	%	11.2	11.8	12.0	12.0	11.8	11.2	11.4	12.0	13.5	15.2	17.0	19.0	22.0	24.5
Z	%	51	52	53	54	55	56	60	61	62	63	65	67	72	74
Kv	J	46	46	46	46	45	46	64	62	86	100	126	146	170	194
HRC carburizing		64	63.5	62	60.5	59	57.5	-	-	-	-	-	-	-	-
Tempering at **°C**		**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**650**	**700**

Depth of case- hardened layer

Depth mm	0.25	0.30	0.40	0.50	0.60	0.65
HRC	-	-	-	**50**	-	-
Time of case-hardening h.	**1**	**2**	**3**	**4**	**6**	**8**

20NiCrMo2 1.6523 **- 220NiCrMoS2-2** 1.6526 EN 10277: 2018

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size mm		Soft annealing +A+SH **Peeled, Ground** +G	Soft annealing +A+C **Cold-drawn**	Heat treatment for pearlite / ferrite +FP+SH **Peeled, Ground**	Heat treatment for pearlite / ferrite +FP+C **Cold-drawn**
from	to	**HBW** max	**HBW** max	**HBW**	**HBW** [b]
5 [a]	10	-	270	-	-
10	16	-	260	-	-
16	40	212	255	149-194	149-240
40	63	212	255	149-194	149-235
63	100	212	255	149-194	149-235

[a] for thickness < 5 mm, mechanical properties should be agreed befor order placement
[b] te hardness values for flats may deviate by ± 10%

20NiCrMo2 Forged UNI 8550: 1984. Use only as reference

size mm		Testing at room temperature (longitudinal)				
		R	**Rp** 0.2	**A%**	**Kcu**	***HB***
from	to	N/mm²	N/mm² min	min (L)	J min (L)	*for inform.*
	11	1175-1570	930	9	27.5	*352-438*
11	25	885-1225	640	10	30	*265-361*
25	40	785-1080	590	10	30	*234-327*
40	60	685-980	490	11	32	*209-295*

Mechanical properties obtained on test blanks after core hardening + stress-relieving
L = longitudinal

ISO 683-3: 2018 **Jominy test HRC** grain size 5 min.

mm distance from quenched end

	1.5	**3**	**5**	**7**	**9**	**11**	**13**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**H**
min	41	37	31	25	22	20	-	-	-	-	-	-	-			
max	49	48	45	42	36	33	31	30	27	25	24	24	23			
min	44	41	36	31	27	24	22	21	-	-	-	-	-			**HH**
max	49	48	45	42	36	33	31	30	27	25	24	24	23			
min	41	37	31	25	22	20	-	-	-	-	-	-	-			**HL**
max	46	44	40	36	31	29	27	26	23	21	20	20	-			

Thermal Expansion	$10^{-6} \bullet K^{-1}$				
Mod. of Elasticity long.	GPa	210			
Mod. of Elasticity tang.	GPa	80			
Density	Kg/dm³	7.86			
°C		**20**	**100**	**200**	**300**

EUROPE EN	**ITALY** UNI	**CHINA** GB	**GERMANY** DIN	**FRANCE** AFNOR	**U.K.** B.S.	**RUSSIA** GOST	**USA** AISI/SAE
20NiCrMo2-2	20NiCrMo2	20CrNiMo	21NiCrMo2	20NCD2	805M20	20HGNM	8620 appr.