Quality	**34CrMo4**	**Quenching and Tempering Steel**	*Technical card*
According to standards	**ISO 683-2: 2018**		***Lucefin Group***
Number	**1.7220**		*rev. 2024*

Chemical composition

C%	**Si%** [a]	**Mn%**	**P%** max	**S%** max	**Cr%**	**Mo%**	**Cu%** max	
0,30-0,37	0,10-0,40	0,60-0,90	0,025	0,035	0,90-1,20	0,15-0,30	0,40	Permissible deviations
± 0.02	± 0.03	± 0.04	+ 0.005	± 0.005	± 0.05	± 0.03	+ 0.05	on the **product**

For 34CrMoS4 n° 1.7226, S% 0.020-0.040 product deviations ± 0.005

[a] Steels may be supplied with a lower silicon content. In this case, alternative means of deoxidation shall be used

Temperature °C

Hot-forming	**Normalizing +N**	**Quenching +Q**	**Tempering +T**	**Stress-relieving +SR**	**Natural state +U**
1100-850	870 air	830-870 oil, polymer or water	540-680 air	50° under the temperature of tempering	(HB max 340)

Soft annealing +A	**Isothermal annealing +I**	**Spheroidizing +AC**	**End quench hardenability test**	**Pre-heating welding**		**Stress-relieving after welding**	
700 slowly 10 °C/h to 600, then air (HB max 223)	830 furnace cooling to 670, then air (HB 180-225)	735 furnace cooling	850 water	250		550 furnace cooling	
				Ac_1	**Ac_3**	**Ms**	**Mf**
				745	800	360	150

Mechanical properties

34CrMo4 1.7220 - **34CrMoS4** n° 1.7226**Hot-rolled** mechanical properties in **quenched and tempered** condition ISO 683-2: 2018

size d / *t*		Testing at room temperature (longitudinal)					
mm		**R**	**Rp** 0.2	**A**%	**Z**%	**Kv_2**	***HBW***
from	to	N/mm²	N/mm² min.	min.	min.	J min.	*for information*
	16/*8*	1000-1200	800	11	45	-	*298-359*
16/*8*	40/*20*	900-1100	650	12	50	40	*271-331*
40/*20*	100/*60*	800-950	550	14	55	45	*240-286*
100/*60*	160/*100*	750-900	500	15	55	45	*225-271*
160/*100*	250/*160*	700-850	450	15	60	45	*213-253*

d = diameter *t* = *thickness*

Table of tempering values obtained at room temperature on rounds of Ø 10 mm after quenching at 850 °C in oil

HB		568	560	543	525	504	475	448	421	400	376	340	306	271	-
HRC		55.5	55	54	53	51.5	49.5	47.5	45	43	40.5	36.5	32.5	28	-
R	N/mm²	2100	2070	2020	1960	1850	1740	1610	1490	1380	1270	1130	1020	900	780
Rp 0.2	N/mm²	1340	1410	1530	1540	1520	1460	1400	1340	1230	1140	1040	930	820	680
A	%	8.0	8.2	9.0	9.6	10.0	10.4	10.8	11.0	11.4	12.2	14.0	17.5	20.0	21.8
Z	%	29	32	37	43	47	48	49	50	52	54	60	65	68	70
Kv	J	27	28	31	34	31	28	27	28	32	42	75	94	127	148
Tempering at **°C**		**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**650**	**700**

Data under fatigue +20 °C, *for information*

+N		Cyclic yield strength, **σ_y'**
+QT	556	N/mm² low cycle number
+N		Cyclic strength exponent, **n'**
+QT	0.12	low cycle number
+N		Cyclic strength coefficient, **K '**
+QT	1198	N/mm² low cycle number
+N		Fatigue strength coefficient, **σ_f '**
+QT	1160	N/mm² low cycle number
+N		Fatigue strength exponent, **b**
+QT	-0.08	low cycle number
+N		Fatigue ductility exponent, **c**
+QT	-0.61	low cycle number

+N = normalization +QT = quenching and tempering

34CrMo4 1.7220 – **34CrMoS4** 1.7226 EN ISO 683-7:24

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Hot-rolled annealed and **Cold-drawn** +A+C						Hot-rolled annealed and **Peeled** +A+SH			
size mm		Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal)			
		R	**Rp** 0.2	**A**%	**HBW**	**R**	**Rp** 0.2	**A**%	**HBW**
from	to	N/mm²	N/mm² min	min		N/mm²	N/mm² min	min	max
5	10	-	-	-	-	-	-	-	-
10	16	-	-	-	-	-	-	-	-
16	40	-	-	-	-	-	-	-	223
40	63	-	-	-	-	-	-	-	223
63	100	-	-	-	-	-	-	-	223

Hot-rolled, quenched and tempered and **Cold-drawn** +QT+C						Hot-rolled, quenched and tempered and **Peeled** +QT+SH			
size mm		Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal) [e]			
		R	**Rp** 0.2	**A**%	**Kv₂**	**R**	**Rp** 0.2	**A**%	**Kv₂**
from	to	N/mm²	N/mm² min	min	J min	N/mm²	N/mm² min	min	J min
5	10	-	-	-	-	-	-	-	-
10	16	-	-	-	-	-	-	-	-
16	40	-	-	-	-	900-1100	650	12	40
40	63	-	-	-	-	800-950	550	14	45
63	100	-	-	-	-	800-950	550	14	45
						[e] values valid also for +C+QT			

34CrMo4 1.7220 **Forged** quenched and tempered UNI EN 10250-3: 2001

size d / *t*		Testing at room temperature						
mm		**R**	**Rp** 0.2	**A**%	**A**%	**Kv**	**Kv**	***HB***
from	to	N/mm² min	N/mm² min	min (L)	min (T)	J min (L)	J min (T)	*min*
	100/*70*	800	550	14	14	45	45	*240*
100/*70*	250/*160*	700	450	15	10	40	22	*213*
250/*160*	500/*330*	650	410	16	12	33	17	*200*

L = longitudinal T = tangential d = diameter *t* = *thickness*

Hardness after tempering. **Lucefin** experience

	Tempering at **530** °C			Tempering at **620** °C		
size mm	≤ 200	> 200 ≤ 400	> 400	≤ 200	> 200 ≤ 400	> 400
HB	**280**	**265**	**250**	**250**	**220**	**200**

EN 10083-3: 2006 **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	49	49	48	45	42	39	36	34	30	28	27	26	25	24	24	
max	57	57	57	56	55	54	53	52	48	45	43	41	40	40	39	
min	52	52	51	49	46	44	42	40	36	34	32	31	30	29	29	**HH**
max	57	57	57	56	55	54	53	52	48	45	43	41	40	40	39	
min	49	49	48	45	42	39	36	34	30	28	27	26	25	24	24	**HL**
max	54	54	54	52	51	49	47	46	42	39	38	36	35	35	34	

Thermal Expansion	$10^{-6} \bullet K^{-1}$ ►	10.5		11.5	12.1	12.7	13.2	13.6	14.0	14.4
Mod. of Elasticity long.	GPa	217	213	212	207	199	192	184	175	164
Mod. of Elasticity tang.	GPa			81	79	76	73	70	67	62
Specific Heat Capacity	J/(Kg•K)	423	456	461	479	499	517	536	558	587
Thermal Conductivity	W/(m•K)			39.6	41.6	41.8	40.3	38.2	36.0	33.6
Density	Kg/dm³			7.81						
Specific Electric Resistivity	Ohm•mm²/m			0.263	0.308	0.378	0.466	0.569	0.687	0.826
Electrical Conductivity	Siemens•m/mm²			3.80	3.25	2.64	2.14	1.76	1.45	1.21
°C		**-100**	**0**	**20**	**100**	**200**	**300**	**400**	**500**	**600**

Physical properties according to DIN SEW 310 (08/1992) standard.
The symbol ► indicates temperature between -100 °C and 0 °C, -100 °C and 20 °C …

EUROPE	**ITALY**	**CHINA**	**GERMANY**	**FRANCE**	**U.K.**	**RUSSIA**	**USA**
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
34CrMo4	34CrMo4	ML30CrMo	34CrMo4	34CD4		34HM	4135