

Quality	34CrAINi7-10	Nitriding Steel	<i>Technical card</i>
According to standard	UNI EN 10085: 2003		Lucefin Group
Number	1.8550		<i>rev. 2018</i>

Chemical composition

C%	Si% max	Mn%	P% max	S% max	Cr%	Mo%	Ni%	Al%	Product deviations are allowed
0,30-0,37 ± 0.02	0,40 + 0.03	0,40-0,70 ± 0.04	0,025 +0.005	0,035 + 0.005	1,50-1,80 ± 0.05	0,15-0,25 ± 0.03	0,85-1,15 ± 0.05	0,80-1,20 ± 0.10	

Temperature °C

Hot-forming	Stress-relieving after machining	Quenching +Q	Tempering +T	Nitrocarburizing	Final stress-relieving +SR			
1050-850	550-580 air	850-890 oil or polymer	570-660 air	570-580	50° under the temperature of tempering			
Soft annealing +A	Ion Nitriding	Nitriding	End quench hardenableity test	Pre-heating welding	Stress-relieving after welding			
650-700 air (HB max 248)	450-490 (HV 1000-1100)	500-520 controlled atm. (HV 940)	900 water	300	550 furnace cooling			
				Ac1 765	Ac3 830	Ms 340	Mf 125	

Mechanical properties

Hot-rolled mechanical properties in **quenched and tempered** condition UNI EN 10085: 2003

size mm		Testing at room temperature (longitudinal)					Surface hardness in quenched and tempered and nitrided condition HV 1
from	to	R N/mm ²	Rp 0.2 N/mm ² min.	A% min.	Kv J min.	HB <i>for information</i>	
16	40	900-1100	680	10	30	271-331	
40	100	850-1050	650	12	30	253-319	
100	160	800-1000	600	13	35	240-298	950
160	250	800-1000	600	13	35	240-298	

Table of tempering values obtained at room temperature on rounds of Ø 10 mm after quenching at 880 °C in oil

		534	534	525	518	504	489	468	448	432	404	376	327	294	271
HB															
HRC		53.5	53.5	53	52.5	51.5	50.5	49	47.5	46	43.5	40.5	35	31	28
R	N/mm ²	1970	1970	1950	1900	1850	1800	1710	1620	1520	1400	1280	1090	980	900
Rp 0.2	N/mm ²	1440	1450	1520	1570	1550	1500	1440	1390	1300	1210	1100	970	820	700
A	%	9.8	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.4	11.2	13.6	15.5	18.4	-
Z	%	38	40	43	43	42	40	39	40	43	45	50	57	63	-
Kv	J	8	11	11	8	7	6	5	4	6	8	17	38	84	152
Tempering at °C		50	100	150	200	250	300	350	400	450	500	550	600	650	700

High-temperature testing

		840	780	760	790	700	580	350
R	N/mm ²							
Rp 0.2	N/mm ²	620	590	580	560	480	410	220
A	%	22	22	22	22	24	26	28
C	%	68	70	68	64	76	80	88
Kv	J	140	150	165	175	150	125	80
Test temperature °C		20	100	200	300	400	500	600

Nitriding. Hardness HV, at different depths and stays

stay time h.	30	860	520	400	360	360	350	350
	90	930	860	710	540	420	350	350
	120	930	860	720	640	540	430	350
	180	940	860	760	720	650	560	350
depth	mm	0,15	0,25	0,35	0,45	0,55	0,65	1,0

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Cold-drawn						Hot-rolled + Peeled					
size mm		Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal)					
from	to	R	Rp 0.2	A%	HB	R	Rp 0.2	A%	HB		
		N/mm ²	N/mm ² min	min		N/mm ²	N/mm ² min	min			
No indications from reference standards						No indications from reference standards					

Forged mechanical properties in quenched and tempered condition UNI EN 10085: 2003

size mm		Testing at room temperature (longitudinal)				
from	to	R	Rp 0.2	A%	Kv	HB
		N/mm ²	N/mm ² min	min	J min	for information
	100	850-1050	650	12	30	253-319
100	160	800-1000	600	13	35	240-298
160	250	800-1000	600	13	35	240-298

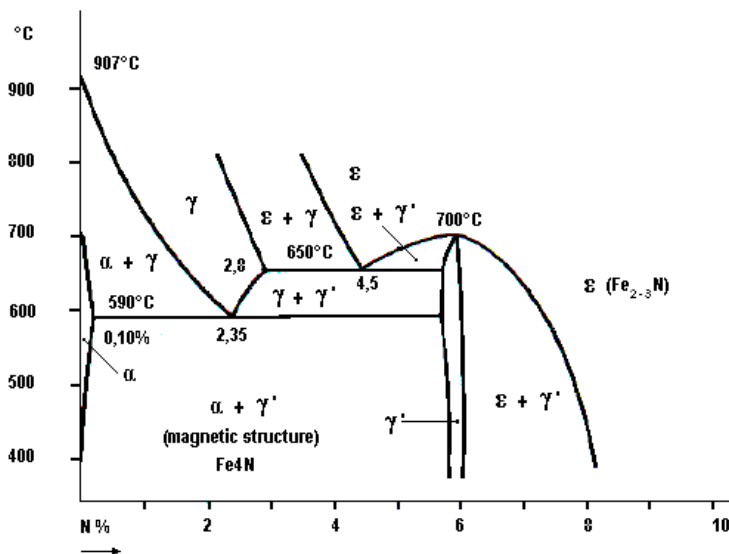
Jominy test HRC 34CrAINi7 UNI 8552. Use only as reference

mm distance from quenched end	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
min	48.5	48	47.5	46.5	45.5	44.5	43.5	43	39	37	34.5	33	32	31.5	31
max	59.5	59	58	57	56.5	56	55.5	55	54	52	50.5	48.5	47	46	45

Thermal Expansion	10 ⁻⁶ •K ⁻¹	▶	11.1	12.1	12.9	13.5	13.9		
Mod. of Elasticity long.	GPa		210	205	185	165	155		
Mod. of Elasticity tang.	GPa		80	79	71	63	59		
Specific Heat Capacity	J/(Kg•K)		460						
Thermal Conductivity	W/(m•K)		35						
Density	Kg/dm ³		7.85						
Specific Electric Resist.	Ohm•mm ² /m		0.31						
Electrical Conductivity	Siemens•m/mm ²		3.22						
°C			20	100	200	300	400	500	600

The symbol ▶ indicates temperature between 20 °C and 100 °C, 20 °C and 200 °C ...

EUROPE	ITALY	CHINA	GERMANY	FRANCE	U.K.	RUSSIA	USA
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
34CrAINi7-10	34CrAINi7-10		34CrAINi7			34H2NMJu	K52440



Iron/Nitrogen equilibrium diagram

As operating in continuous flow conditions, at temperatures higher than 480 °C gaseous ammonia releases nitrogen and hydrogen, that are absorbed and diffused in the sub-superficial steel layer.

Nitrogen reacts with steel elements and creates very hard but very fragile nitrides.

The lack of alloy elements in carbon steel causes the creation of iron nitrides only, thus giving steel significant fragility.

To prevent this inconvenient, steels containing Al, V, Cr, Mo (more similar to nitrogen than to iron) are used.

Maximum temperature suggested for nitriding is 580 °C, avoiding the eutectoid of 590 °C.

Fe₄N = ferrite micro-crystals and nitrides

Fe₂₋₃N = nitrides behaving like a barrier against the diffusion of nitro.

(Can L. Richards, Technical report. University of Missouri – Rolla. www.metalquality.it)