Quality	**C55E**	**Quenching and Tempering Steel**	*Technical card*
According to standard	**ISO 683-1: 2018**		***Lucefin Group***
Number	**1.1203**		*rev. 2018*

Chemical composition

C%	**Si%**	**Mn%**	**P%** max	**S%** max	**Cr%** max	**Mo%** max	**Ni%** max	**Cu%** max	
0,52-0,60	0,10-0,40	0,60-0,90	0,025	0,035	0,40	0,10	0,40	0,30	Product deviations are allowed
± 0.03	± 0.03	± 0.04	+ 0.005	± 0.005	+ 0.05	+ 0.03	+ 0.03	+ 0.05	

Cr+Mo+Ni max 0.63%
For C55R n° 1.1209, S% 0.020-0.040 product deviations ± 0.005

Temperature °C

Hot-forming	**Normalizing +N**	**Quenching +Q**	**Quenching +Q**	**Tempering +T**		**Stress-relieving +SR**	
1050-850	825-865 air	820 water	845 oil or polymer	550-660 air		50° under the temperature of tempering	
Soft annealing +A	**Isothermal annealing +I**	**Natural state +U**	**End quench hardenability test**	**Pre-heating welding**		**Stress-relieving after welding**	
680-700 air (HB max 229)	790 furnace cooling to 660, then air (HB 200-245)	(HB max 270)	830 water	250		600 furnace cooling	
				Ac_1	**Ac_3**	**Ms**	**Mf**
				730	765	300	80

Mechanical properties

C55E – C55R Hot-rolled mechanical properties in **normalized** condition ISO 683-1: 2018

size d / *t* mm		Testing at room temperature (longitudinal)					
		R	**Re_H** [a]	**A%**	**Z%**	**Kv_2**	***HB** for information*
from	to	N/mm² min	N/mm² min.	min.	min.	J min.	*min*
	16/*16*	680	370	11	-	-	*208*
16/*16*	100/*100*	640	330	12	-	-	*198*
100/*100*	250/*250*	620	300	12	-	-	*190*

[a] Re_H upper yield strength or, if no yield phenomenon occurs, $Rp_{0.2}$ has to be considered
d = diameter *t* = *thickness*

Hot-rolled mechanical properties in **quenched and tempered** condition ISO 683-1: 2018

size d / *t* mm		Testing at room temperature (longitudinal)					
		R	**Re_H** [a]	**A%**	**Z%**	**Kv_2**	***HB***
from	to	N/mm²	N/mm² min	min.	min.	J min	*for information*
	16/*8*	800-950	550	12	30	-	*240-286*
16/*8*	40/*20*	750-900	490	14	35	-	*225-271*
40/*20*	100/*60*	700-850	420	15	40	-	*213-253*

[a] Re_H upper yield strength or, if no yield phenomenon occurs, $Rp_{0.2}$ has to be considered
d = diameter *t* = *thickness*

Table of tempering values obtained at room temperature on rounds of Ø 60 mm after quenching at 830 °C in oil

HB		286	268	253	240	226	223	162
HRC		28	25	23	22.5	20	-	-
R	N/mm²	950	890	850	800	760	720	560
Rp 0.2	N/mm²	650	590	530	480	430	400	380
A	%	9	11	13	16	18	19	24
Z	%	28	38	42	45	50	50	-
Tempering at **°C**		**400**	**450**	**500**	**550**	**600**	**650**	**690**

C55 1.0535

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Cold-drawn +C [c] EN 10277-2: 2008 *only reference*						Hot-rolled and **Peeled** +SH [d]			
size		Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal)			
mm		**R** [a]	**Rp** 0.2 [a]	**A**%	***HBW***	**R**	**Rp** 0.2	**A**%	**HBW**
from	to	N/mm²	N/mm² min	min	*for inform.*	N/mm²	N/mm² min	min	
5 [b]	10	770-1100	590	5	*231-331*	-	-	-	-
10	16	730-1080	520	6	*224-327*	-	-	-	-
16	40	690-1050	440	7	*210-319*	610-910	-	-	181-269
40	63	650-1030	390	8	*200-311*	610-910	-	-	181-269
63	100	-	-	-	-	610-910	-	-	181-269

[a] for flats and special sections, yield point can be – 10% and tensile strenght can be ± 10%
[b] for thickness < 5 mm, mechanical properties should be agreed before order placement
[c] values valid also for +C+G
[d] values valid also for +SH+G

C55E 1.1203 **Forged** normalized UNI EN 10250-2: 2001

size		Testing at room temperature (longitudinal)						
mm		**R**	**Re** [c]	**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	640	330	12	-	-	-	*198*
100	250	620	300	12	9	-	-	*190*
250	500	600	260	12	9	-	-	*178*
500	1000	590	250	11	8	-	-	*176*

C55E 1.1203 **Forged** quenched and tempered UNI EN 10250-2: 2001

size d / *t*		Testing at room temperature (longitudinal)						
mm		**R**	**Re** [c]	**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*	700	420	15		-	-	*213*
100/*70*	250/*160*	630	360	17	11	-	-	*192*
250/*160*	500/*330*	610	330	16	10	-	-	*183*

L = longitudinal T = tangential
[c] Re upper yield strength or, if no yield phenomenon occurs, Rp 0.2 has to be considered
d = diameter *t* = *thickness*

ISO 683-1: 2018 **Jominy test HRC** grain size 5 min.

mm distance from quenched end

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**13**	**15**	**20**	**25**	**30**	**H**
min	58	55	47	37	33	32	31	30	29	28	27	26	25	24	22	20	
max	65	64	63	62	60	57	52	45	37	36	35	34	33	32	30	29	

Thermal Expansion	$10^{-6} \cdot K^{-1}$	►	11.1	12.4	13.9	
Mod. of Elasticity long.	GPa	205				
Mod. of Elasticity tang.	GPa	79				
Specific Heat Capacity	J/(Kg•K)	486				
Thermal Conductivity	W/(m•K)	49.8				
Density	Kg/dm³	7.85				
Specific Electric Resist.	Ohm•mm²/m		0.22			
Electrical Conductivity	Siemens•m/mm²		4.54			
°C		**20**	**100**	**300**	**500**	

The symbol ► indicates temperature between 20 °C and 100 °C, 20 °C and 300 °C …

EUROPE	**ITALY**	**CHINA**	**GERMANY**	**FRANCE**	**U.K.**	**RUSSIA**	**USA**
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
C55E	C55	55	Ck55	XC55 H1	870M55		1055