

Quality	52CrMoV4	Spring Steel	<i>Technical card</i> Lucefin Group rev. 2018
According to standards	EN 10089: 2002		
Number	1.7701		

Chemical composition

C%	Si%	Mn%	P%	S%	Cr%	Mo%	V%
0,48-0,56	max 0,40	0,70-1,10	max 0,025	max 0,025	0,90-1,20	0,15-0,30	0,10-0,20
± 0.02	± 0.03	± 0.05	+ 0.005	+ 0.005	± 0.05	± 0.03	± 0.02

Product deviations are allowed

Other elements not mentioned above should not be added to the steel, except for those necessary to casting

Cu + 10Sn ≤ 0,60

Temperature °C

Hot-forming	Normalizing +N	Natural state +U	Quenching +Q on spring	Tempering +T	Hot moulding of springs	
1050-850	880-850 air	- (HB max 310)	850-870 oil or polymer	400-460 air	900-830	
Soft annealing +A	Spheroidized annealing +AC	End quench hardenability test	Pre-heating welding	Stress-relieving after welding		
680-640 slow cooling in furnace (HB max 248)	820 furnace cooling 50 °C/h to 700, then air (HB max 230)	850 water		not allowed		
			Ac1	Ac3	Ms	Mf
			740	780	250	40

Mechanical properties

Hot-rolled mechanical properties after quenching at 860 °C in oil and tempering at 450 °C air EN 10089: 2002

size mm		Testing at room temperature (longitudinal)					
from	to	R	Rp 0.2	A%	Z%	KU	Kv for guidance
	54	N/mm ² 1450-1750	N/mm ² min. 1300	min 6	min. 35	J min. 10	J min. 6

Typical values at room temperature for quenched and tempered material

size mm		Testing at room temperature (longitudinal)					
		R	Rp 0.2	A%	Z%	KU	Kv
	25	N/mm ² 1120	N/mm ² 930	min 12	min 42	J 40	J min. 40

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

HB		490	475	437	400	371
HRC		51	48.5	46.5	43	40
R	N/mm ²	1800	1690	1540	1400	1250
Rp 0.2	N/mm ²	1600	1430	1280	1160	1000
A	%	6	7	7.5	8.5	10
Kv	J	12	10	12	14	16
Tempering	°C	400	450	500	550	600

EN 10089: 2002 **Jominy test HRC** grain size 5 min.

distance in mm from quenched end

	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50	Symbol
min	57	56	56	55	53	52	51	50	48	47	46	46	45	44	44	Type H
max	67	67	67	67	67	67	67	67	66	66	66	65	65	65	64	H
min	60	60	60	59	58	57	56	56	54	53	53	52	52	51	51	Type HH
max	67	67	67	67	67	67	67	67	66	66	66	65	65	65	64	HH

Max thickness and diameter recommended for the spring to obtain, after quenching, internal hardness of 50 HRC and 80% martensite structure	Flats mm	Rounds mm	Max thickness and diameter recommended for the spring to obtain, after quenching, internal hardness of 54 HRC and 90% martensite structure	Flats mm	Rounds mm
	> 100	> 100		39	54

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Thermal Expansion	$10^{-6} \cdot K^{-1}$	►	11.5	12.5	13.5	13.9
Modulus of Elasticity long.	GPa		210			
Modulus of Elasticity tang.	GPa		80			
Specific Heat Capacity	J/(Kg•K)		470			
Thermal Conductivity	W/(m•K)		42.6			
Density	Kg/dm ³		7.68			
Specific Electric Resis.	$\Omega \cdot mm^2/m$		0.19			
Electrical Conductivity	Siemens•m/mm ²		5.26			
°C			20	100	200	300 400

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
52CrMoV4	52CrMoV4		1.7701	51CDV4			4150 ~