

Quality	46S20	Free-cutting Steel	<i>Technical card</i>
According to standard	ISO 683-4: 2018		Lucefin Group
Number	1.0727		rev. 2024

Chemical composition

C%	Si% max	Mn%	P% max	S%	Pb%	
0,42-0,50 ± 0.03	0,40 ± 0.03	0,70-1,10 ± 0.04	0,06 ± 0.008	0,15-0,25 ± 0.03	- -	Product deviations are allowed

Temperature °C

Hot-forming	Natural state +U	Soft annealing +A	Carburizing	Hardening on carburized surface	Stress-relieving +SR
1230-950	(HB 234 max)	680 air			
Normalizing +N	Direct hardening	Direct hardening	Stress-relieving +SR	Pre-heating welding	Stress-relieving after welding
860 air	840 water	860 oil or polymer	540-680 furnace cooling	not recommended	

Mechanical properties

Hot-rolled natural forming condition ISO 683-4: 2018				Hot-rolled quenched and tempered			
Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal)			
size mm	R	HBW		R	Rp 0.2	A%	HBW
from to	N/mm ²	max		N/mm ²	N/mm ² min	min	for inform.
5 10	590-800	234		700-850	490	12	213-253
10 16	590-780	228		700-850	490	12	213-253
16 40	590-760	222		650-800	430	13	200-240
40 63	580-730	213		630-780	370	14	192-232
63 100	560-710	207		630-780	370	14	192-232

Cold-drawn +C EN ISO 683-7:24				Hot-rolled Peeled +SH				
Values valid also for +C+G				Values valid also for +SH+G				
size mm	Testing at room temperature (longitudinal)			Testing at room temperature (longitudinal)				
	R ^{a)}	Rp 0.2 ^{a)}	A%	HBW	R	Rp 0.2	A%	HBW
from to	N/mm ²	N/mm ² min	min	for inform.	N/mm ²	N/mm ² min	min	max
5 ^{b)} 10	740-980	570	5	224-295	-	-	-	-
10 16	690-930	470	6	210-278	-	-	-	-
16 40	640-880	400	7	198-263	590-760	-	-	222
40 63	610-850	380	8	183-253	580-730	-	-	213
63 100	580-820	340	8	172-246	560-710	-	-	207

^{a)} for flats and special sections, yield point can be – 10% and tensile strength can be ± 10%

^{b)} for thickness < 5 mm, mechanical properties should be agreed before order placement

Cold-drawn + quenching and tempering +C+QT EN ISO 683-7:24				Quenched and tempered + cold-drawn +QT+C				
size mm	Testing at room temperature (longitudinal)			Testing at room temperature (longitudinal)				
	R ^{c)}	Rp 0.2 ^{c)}	A% ^{c)}	HB ^{c)}	R	Rp 0.2	A%	HB
from to	N/mm ²	N/mm ² min	min	for inform.	N/mm ²	N/mm ² min	min	for inform.
5 ^{b)} 10	-	-	-	-	850-1000	595	8	253-298
10 16	-	-	-	-	800-950	560	9	240-286
16 40	650-800	430	13	200-240	700-850	490	10	213-253
40 63	630-780	370	14	192-232	700-850	490	11	213-253
63 100	630-780	370	14	192-232	650-850	455	11	200-253

^{c)} values valid also for +C+QT+G and +QT+SH

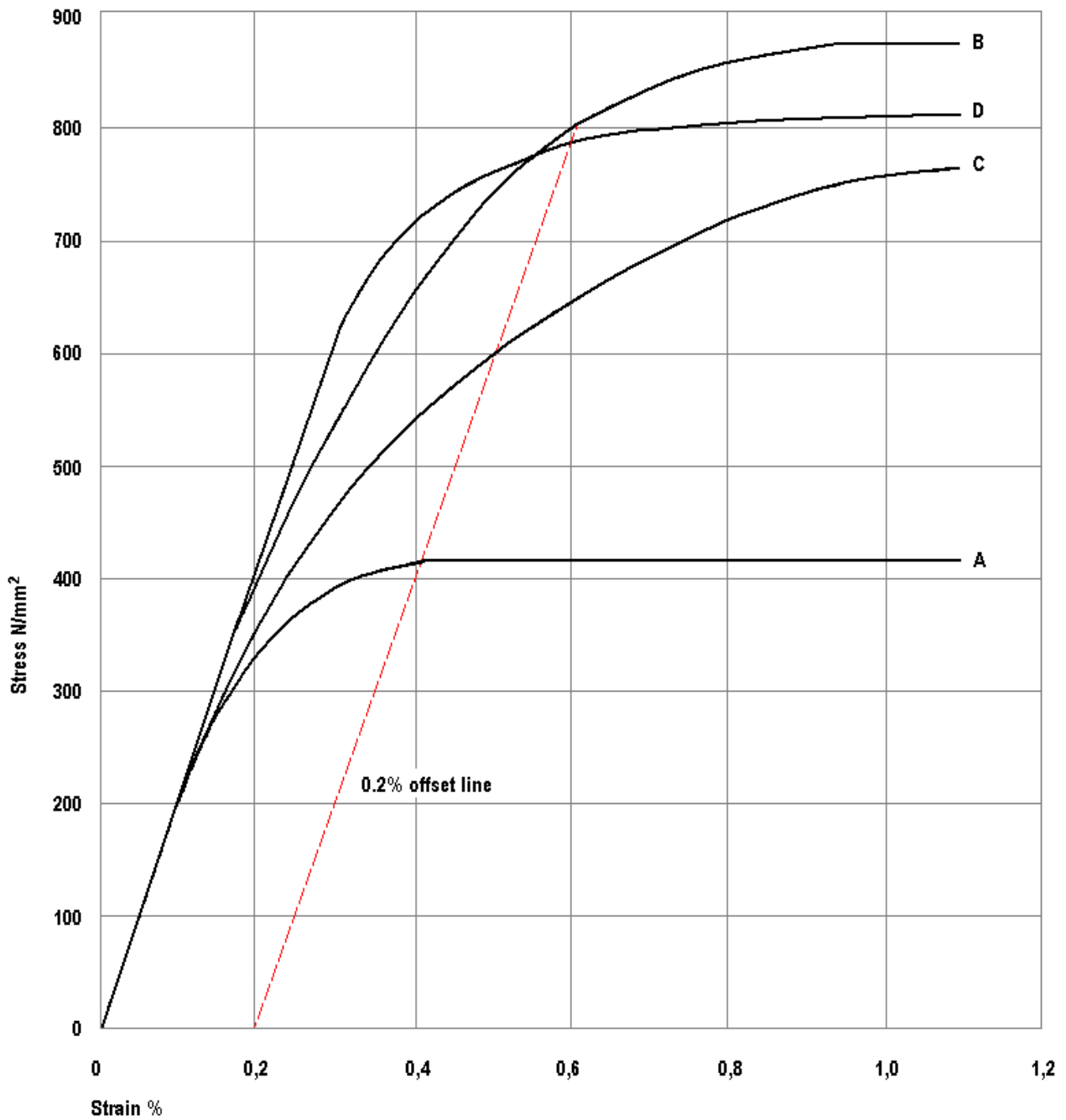
^{b)} for thickness < 5 mm, mechanical properties should be agreed before order placement

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

HB	560	560	525	482	390	327	279
HRC	55	55	53	50	42	35	29
R N/mm²	2070	2070	1950	1760	1340	1080	930
Temp. at °C	50	100	200	300	400	500	600

EUROPE	ITALY	CHINA	GERMANY	FRANCE	U.K.	RUSSIA	USA
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
46S20	46S20	Y45	45S20	45MF4	46S20		1146/1144

Cumulative effects of cold drawing, straightening, and stress relieving on the yield and tensile strength of 1144 (~ 46S20) hot rolled steel.



- A hot rolled
- B cold drawn
- C cold drawn and straightened
- D cold drawn, straightened and stress relieved