

# Stainless Steel Other Physical Properties

In addition to the usual mechanical properties of tensile strength, proof strength, elongation and hardness, other ancillary properties of Stainless Steel are often required.

Property	Unit	Mild Steel	3CR12 3CR12L 410S	409	430 430DDQ	439 441	434	436 444	LDX2101® 2507 2001 2304 2205	202	301 304 304L	321	316L 316Ti	309S	310S	904L
Modulus of elasticity in tension	GPa	200	200	200	200	210	210	220	200	200	193	193	193	200	200	190
in torsion		65	77	77	65		65	65			86	86	70	70	70	
Specific heat capacity	J/ kg K	455	478	460	460	460	460	430	470	460	500	500	500	500	500	500
Thermal conductivity at 100°C	W/ m K	73	30.0	23.0	26.1	24.2	26.1	26.8	17.0	24.2	16.2	16.1	16.2	15.6	14.2	
at 500°C		70	40.0	25.0	26.3	26.3	26.3	27.1	21.1	30.6	21.5	22.2	21.5	18.7	18.5	
Electrical resistivity	1x10 <sup>-8</sup> Ωm	65	67	61	60	63	65	57	85	74	72	72	74	78	78	-
Coefficient of thermal expansion	µm/ m K															
0 - 100°C		12.5	11.1	11.1	10.4	10.2	10.4	10.8	13.0	16.2	17.2	16.6	15.9	15.9	15.9	15
0 - 300°C		13.0	11.7	11.7	11.0	11.4	11.0	11.6	14.0	17.2	17.8	17.2	16.2	16.6	16.2	-
0 - 500°C		13.8	12.3	12.4	11.4	11.6	11.4	12.0	14.5	18.6	18.4	18.6	17.5	17.2	17.0	-
Melting range	°C	-	1430-1510	1480-1530	1425-1510	1390-1460	1480-1530	1405-1495	1410-1460	1400-1450	1400-1450	1390-1430	1390-1430	1400-1450	1400-1450	-
Magnetic		yes	yes	yes	yes	yes	yes	yes	yes	no	no	no	no	no	no	no

## Properties at elevated temperatures

Short-time elevated temperature strength: tensile strength in MPa at indicated temperature.

Temperature °C	100	300	500	700	900
3CR12/ 410S	545	415	330		(1)
409	380	350	280	110	
430/ 430DDQ	490	450	330	100	(2)
439Nb	420	360	250	30	
441	460	400	350	200	
434	500	470	400	130	
436	540	480	410	200	
444	500	440	380	160	
2001	590	510			(3)
2304	580	490			(3)
2205	630	560			(3)
304 types	530	480	400	240	70
304L types	480	430	350	200	50
321	540	510	420	260	100
316L types	530	510	420	250	90
316Ti	540	500	450	320	130
309S	580	525	470	300	125
310S	600	530	475	315	135
2507	680	610			
LDX2101®	590				

- (1) Do not exceed 800°C as a phase transformation occurs.  
(2) Do not use in temperature range of 450°C to 500°C.  
(3) Do not use in temperature range of 300°C to 1 000°C.

NOTE: the values given above are typical. Stainless steels within the same classification (e.g. Austenitic stainless steels) will have similar values, but even slight variations of chemical composition within the specification limits of the same steels will affect the actual value. Reported values are often slightly different, depending on the reference. Many of these properties are temperature dependent. The values given above should **not** be used as guaranteed or minimum values. Values are typical values and should **not** be used for design purposes.

\* Whilst every effort is made to ensure the above information is correct, we must stipulate that the above information is a guide line and is subject to our standard disclaimer available on our website.

Maximum recommended service temperature: in oxidising conditions.

Max Temperature °C	Continuous	Intermittent
Mild Steel	500	600
409/ 3CR12/ 410S	620	730
430/ 430DDQ	730	870
439	830	930
441	850	950
434/ 436	730	870
444	850	950
2001/ 2304/ 2205	880	880
202	780	750
304/ 304L/ 321 types	830	800
316L/ 316Ti types	920	870
309S types	1100	980
310S	1200	1030

Creep strength: stress in MPa required for a creep rate of 1% in 10 000hr.

Temperature °C	400	500	600	700	800
3CR12/ 410S	270	56	13	3	0.6
430/ 430DDQ	272	92	31	4	0.7
304 types		233	108	50	23
321			131	51	20
316Ti			147	63	29
309S types		141	72	29	8
310S types		145	84	36	9