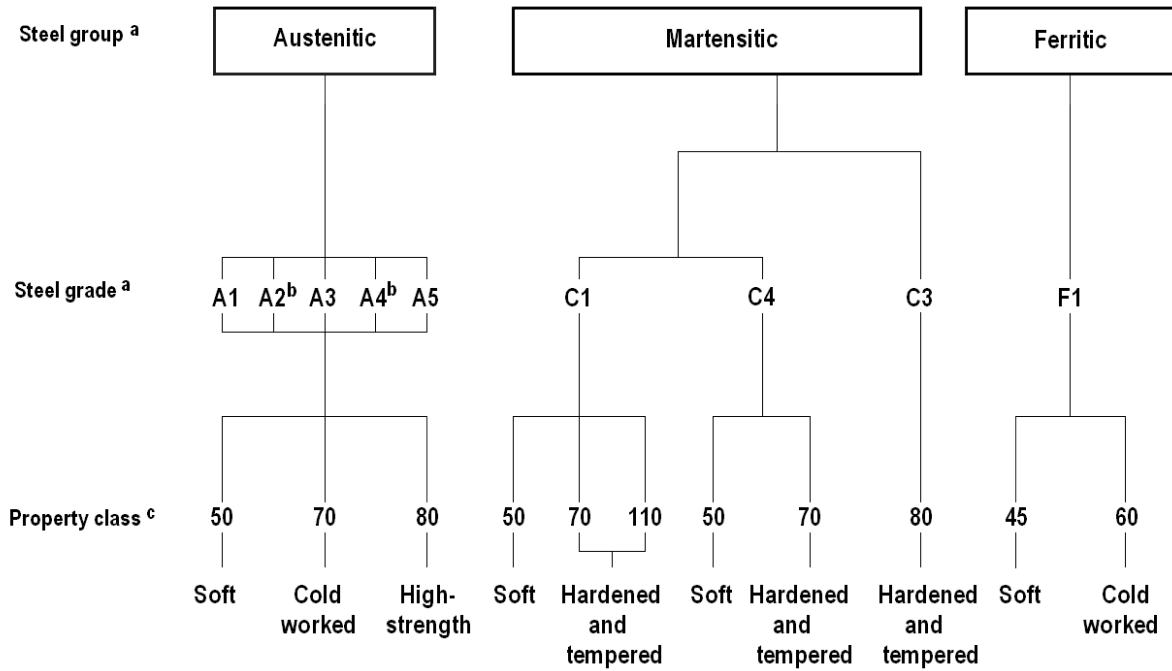


DESIGNATION SYSTEM OF SCREWS, BOLTS AND STUDS OF STAINLESS STEELS EN ISO 3506-1

The designation of the material consists of two blocks, which are separated by a hyphen.
The first block designates the steel grade and the second block, the property class.



a Groups and steel Grades

b Low-carbon austenitic stainless steels with carbon content not exceeding 0,03 % may additionally be marked with an "L" ex. A4L-80

c Fasteners passivated in accordance with ISO 16048 may additionally be marked with a "P" ex. A4-80P

GROUP	GRADE	C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%	Cu%	REMARK
A austenitic steel	A1	≤ 0,12	≤ 1	≤ 6,5	≤ 0,20	0,15-0,35	16-19	≤ 0,7	5-10	1,75-2,25	b) c) d)
	A2	≤ 0,10	≤ 1	≤ 2	≤ 0,050	≤ 0,030	15-20	e)	8-19	≤ 4	f) g)
	A3	≤ 0,08	≤ 1	≤ 2	≤ 0,045	≤ 0,030	17-19	e)	9-12	≤ 1	h)
	A4	≤ 0,08	≤ 1	≤ 2	≤ 0,045	≤ 0,030	16-18,5	2-3	10-15	≤ 4	g) i)
	A5	≤ 0,08	≤ 1	≤ 2	≤ 0,045	≤ 0,030	16-18,5	2-3	10,5-14	≤ 1	h) i)
C martensitic steel	C1	0,09-0,15	≤ 1	≤ 1	≤ 0,050	≤ 0,030	11,5-14		≤ 1		i)
	C3	0,17-0,25	≤ 1	≤ 1	≤ 0,040	≤ 0,030	16-18		1,5-2,5		
	C4	0,08-0,15	≤ 1	≤ 1,5	≤ 0,060	0,15-0,35	12-14	≤ 0,6	≤ 1		b) i)
F ferritic	F1	≤ 0,12	≤ 1	≤ 1	≤ 0,040	≤ 0,030	15-18	e)	≤ 1		

Example **A2-70** austenitic steel, cold worked, min. 700 N/mm² tensile strength

REMARK

b) sulfur may be replaced by selenium.

c) if the nickel content is below 8 %, the minimum manganese content shall be 5 %.

d) there is no minimum limit to the copper content, provided that the nickel content is greater than 8 %.

e) molybdenum may be present at the discretion of the manufacturer.

f) if the chromium content is below 17 %, the minimum nickel content should be 12 %.

g) for austenitic stainless steels having a maximum carbon content of 0,03 %, nitrogen may be present to a maximum of 0,22 %.

h) material stabilized with titanium or niobium

i) the carbon content may be higher where required in order to obtain the specified mechanical properties, but shall not exceed 0,12 % for austenitic steels.

Some prescription for the selection of fasteners

- the martensitic steels are useful when high resistance links are needed in weak aggressive environments are needed
- the ferritic steels have a higher resistance to corrosion, but require a periodic maintenance
- the austenitic steels have the best anti-corrosion performances, despite a smaller mechanical resistance (compared to martensitic)

DESIGNATION SYSTEM OF SCREWS, BOLTS AND STUDS OF STAINLESS STEELS EN ISO 3506-1

CORROSION-RESISTANT STAINLESS-STEEL fasteners EN ISO 3506-1: 2009

PART 1	PART 2	PART 3	PART 4
bolts, screws and stud bolts	nuts	screws and similar fasteners not under tensile stress	tapping screws

RECOMMENDED STEELS

GRADE	EN	AISI	PRODUCTION TECHNIQUE	APPLICATIONS
A1	1.4305	303	turning	wood screws, metal screws, tapping screws, nuts
A2	1.4567		hot-forming / cold-forming, rolling	wood screws, metal screws, tapping screws, nuts
A3	1.4541	321	turning	linkages to high temperatures max 800 °C
A4	1.4401	316	hot-forming / cold-forming, rolling	wood screws, metal screws, tapping screws, nuts
A5	1.4571	Tp. 316Ti	turning	linkages for marine applications
C1	1.4006	410	turning, pressing, rolling	metal screws, tapping screws,
C3	1.4057	431	turning, cold-heading / cold rolling	screw anchor
C4	1.4005	416	turning	metal screws, tapping screws, nuts
F1	1.4016	430	hot-forming / cold-forming, rolling	wood screws, metal screws, tapping screws, nuts



MECHANICAL PROPERTIES

GRADE	CLASS	THREAD	HARDNESS						STATE OF SUPPLY
			HB	HRC	HV	R N/mm ²	Rp _{0.2} N/mm ²	A ²⁾ %	
A1 - A2	50	≤ M39				> 500	> 210	> 0,6 d	softened
A3	70	≤ M24 ¹⁾				> 700	> 450	> 0,4 d	work hardened
A4 - A5	80	≤ M24 ¹⁾				> 800	> 600	> 0,3 d	high work hardened
C1	50		147-209		155-220	> 500	> 250	> 0,2 d	softened
	70		209-314	20-34	220-330	> 700	> 410	> 0,2 d	quenched/tempered
	110 ³⁾			36-45	350-440	> 1100	> 820	> 0,2 d	quenched/tempered
C3	80		228-323	21-35	240-340	> 800	> 640	> 0,2 d	quenched/tempered
C4	50		147-209		155-220	> 500	> 250	> 0,2 d	softened
	70		209-314	20-34	220-330	> 500	> 410	> 0,2 d	quenched/tempered
F1 ⁴⁾	45		128-209		135-220	> 450	> 250	> 0,2 d	softened
	60		171-271		180-285	> 600	> 410	> 0,2 d	work hardened

¹⁾ for elements with nominal diameter > 24 mm the mechanical properties shall be agreed in order

²⁾ the minimum value is obtained by multiplying 0, .. for the nominal diameter of bolts, screws and studs

³⁾ hardened and tempered at a minimum tempering temperature of 275 °C.

⁴⁾ Nominal thread diameter < 24 mm.

ALLOY-STEEL AND STAINLESS STEEL BOLTING FOR HIGH TEMPERATURE OR HIGH PRESSURE SERVICE

ASTM A 193/A 193M

Hot-wrought alloy-steel and stainless steel Bolting Materials for High Temperature or High Pressure Service
 Cover also screws and stud bolts.

GRADE	CLASS	DESCRIPTION
B7	...	alloy steels AISI 4140/4142 quenched and tempered (EN 42CrMo4)
B8	1	stainless steels AISI 304 solution annealed (EN 1.4301)
B8M	1	stainless steels AISI 316 solution annealed (EN 1.4401)
B8	2	stainless steels AISI 304 solution annealed and cold working (EN 1.4301)
B8M	2	stainless steels AISI 316 solution annealed and cold working (EN 1.4401)

CHEMICAL COMPOSITION

GRADE	CLASS	C%	Mn%	P%	S%	Si%	Cr%	Mo%	Ni%
B7	...	0,37-0,49	0,65-1,10	< 0,035	< 0,040	0,15-0,35	0,75-1,20	0,15-0,25	
B8	1	< 0,08	< 2,00	< 0,045	< 0,030	< 1,00	18,0-20,0		8,0-11,0
B8M	1	< 0,08	< 2,00	< 0,045	< 0,030	< 1,00	16,0-18,0	2,0-3,0	10,0-14,0
B8	2	< 0,08	< 2,00	< 0,045	< 0,030	< 1,00	18,0-20,0		8,0-11,0
B8M	2	< 0,08	< 2,00	< 0,045	< 0,030	< 1,00	16,0-18,0	2,0-3,0	10,0-14,0

MECHANICAL REQUIREMENTS		MIN. TEMPERING TEMPERATURE °C	min. R N/mm ²	min. Rp _{0.2} N/mm ²	min. A %	min. C %	max. HB
GRADE	SIZE						
B7	< M64	593	860	720	16	50	321
	> M64 < M100	593	795	655	16	50	321
	> M100 < M180	593	690	515	18	50	321
B8 cl. 1	all		515	205	30	50	223
B8M cl. 1	all		515	205	30	50	223
B8 cl. 2	< M20		860	690	12	35	321
	> M20 ≤ M24		795	550	15	35	321
	> M24 ≤ M30		725	450	20	35	321
	> M30 ≤ M36		690	345	28	45	321
B8M cl. 2	< M20		760	655	15	45	321
	> M20 ≤ M24		690	550	20	45	321
	> M24 ≤ M30		655	450	25	45	321
	> M30 ≤ M36		620	345	30	45	321

Remark: Charpy impact test shall be made as agreed between the manufacturer and the purchaser