RHINO HARDWARE

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Stainless Steel Properties

Extract from DIN 267 Part 11 - Chemical Composition of austenitic chromium-nickels steels in % by weight

Austenitic Grade	Material No. to AISI	C	Si	Mn	P	S	Cr	Mo	Ni
A1	303	0.12	1	2	0.2	0.15 to 0.35	17.0 to 19.0	0.6	8.0 to 10.0
A2	304	0.08	1	2	0.05	0.03	17.0 to 20.0	-	8.0 to 13.0
A4	316	0.08	1	2	0.05	0.03	16.0 to 18.5	2.0 to 3.0	10.0 to 14.4

Maximum values unless otherwise stated.
Types A2 and A4 may contain up to a maximum of 4% copper.
The selection of steel grades within a group is the prerogative of the manufacturer, unless the purchaser has specified particular
steels to ISO or national standards.
Different grades of steel may be used as long as all physical and mechanical properties and the corresponding corrosion resistance
of the finished product are achieved. Only when all these conditions are fulfilled may finished articles be marked in accordance
with DIN 267 Part 11.

Mechanical Properties-Austenitic Grades

Bolts, Screws and Studs

Grade	Property Class	Tensile Strength Rm MPa(N/mm2) Min.	Yield Stress Rp 0.2 Mpa(N/mm2) Min.
A2 and A4	70	700	450
	80	800	600
Grade	**Elongation $A_{L,\ Min}$**	**Proof Load StressSp Mpa (N/mm2) Min**	**Diameter Range**
A2 and A4	0.4d	700	=<M20
	0.3d	800	=<M20

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Comparison: US and ISO (DIN) Stainless Steels

Tensile Load

A2 and A4 as compared to 304 and 316	Percent difference from US - Stainless Steel
up to M20	44% higher
M22 and over	6% lower

Selection of Diameters - Tightening Torques, Loads

Guideline values for screws in steel groups A2-70 and A4-70 with standard metric threads

Diameter	Load [1)]	Initial Stressing Force	Tightening	Force in service N		
	Force at 0.2% yield point N	N	Torque			
			Nm	Axial	Axial	Radial
				Static	Dynamic	Static or Dynamic
M3	2250	1420	0.9	610	360	120
M4	3960	2490	2.2	1070	640	210
M5	6390	4030	4.3	1730	1040	350
M6	9040	5700	7.3	2440	1470	490
M8	16470	10380	17.7	4450	2670	890
M10	26100	16440	35.5	7050	4230	1410
M12	37930	23900	61.3	10240	6150	2050
M16	70650	44510	147.1	19080	11450	3820
M20	110250	69460	285.1	29770	17860	5950

1)The values correspond to 100% of the 0.2%

Notes on application:
When selecting the correct screw diameter it should be ensured that the total load on the screw does not exceed 90% of the
standardized 0.2% yield stress. Care should be taken to ensure correct initial tensioning, with a torque wrench wherever possible.
Experience has shown that a utilization of 70% of the total load is reasonable average for the initial stressing force to allow
additional forces in service to be taken up.

The table above is only intended as an aid for quick comparison

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Comparative International Stainless Steel Grades

British	French	German	Italian	Japanese	Swedish	USA
304S21	Z12CN17.08	1.431	X12CrNi 17 07	SUS301	14 23 31	301
304S31				SUS302	14 23 32	302
304S15	Z8CN18.09	1.4301	X5CrNi 18 10	SUS301	14 23 33	304
304S16						
304S11	Z2CN18.10	1.4306	X2CrNi 18 11	SUS304L	14 23 52	304L
305S19	Z8CN18.12		X8CrNi 18 12	SUS305		305
309S24	Z15CN24.13		X16CrNi 23 14	SUS309		309
310S24	Z12CN25.20	1.4845	Z22CrNi 25 20	SUS310S	14 23 61	310
315S16					14 23 40	
316S31	Z6CND17.11	1.4401	X8CrNiMo 17 13	SUS316	14 23 43	316
316S33		1.4436			14 23 47	
316S11	Z2CND17.12	1.4404	X2CrNiMo 17 12	SUS316L	14 23 53	316L
316S13		1.4435			14 23 48	
317S12	Z2CND19.15	1.4435	X2CrNiMo 18 16	SUS317L	14 23 67	317L
317S16		1.4436		SUS317	14 23 66	317
320S31	Z8CND17.12	1.4571			14 23 50	
320S33		1.4573				
321S31	Z6CNT18.12	1.4541	X6CrNiTi 18 11	SUS321	14 23 37	321
347S31	Z6CNNb18.11	1.4558	X6CrNiNb 18 11	SUS347	14 23 38	347
			X8CrNiNb 18 11			
403S17	Z6C13	1.4	X6Cr13	SUS403	14 23 01	403
405S17	Z6CA13	1.4002	Z6CrA1 13	SUS405		405
409S19		1.4512				409
430S17	Z8C17	1.4016	X8Cr 17	SUS430	14 23 20	430
434S17	Z8CD17.01	1.4113	X8CrMo 17	SUS434	14 23 25	434
410S21	Z12C13	1.4006	X12Cr 13	SUS410	13 23 02	410
		1.4024				
410S45	Z30C13		X30Cr 13	SUS420JS	14 23 04	420

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Steels For Screws, Bolts and Studs

Steels generally used for metric screws, bolts and studs

Property Class	Size	Materials per DIN [1)]	Materials per ANSI [1)]
3.6/4.6	to M39	QSt 36-2	1006/1010
		USt 38-2	
		UQSt 36-2	
		UQSt 38-2	
4.8	to M16	QSt 36-2	1006/1010
		QSt 38-2	
5.6	to M39	Cq 22	1022
5.8	to M39	Cq 22	1022/1035
		Cq 35	
8.8	to M12	22B2	10B22/10B28/1035 (1038)
		28B2	
		Cq 35	
	to M22	35B2	10B35(1038) /1045
		Cq 35	
		Cq 45	
		46 Cr 1	
	over M24 to M39	34 Cr 4	5132/5135
		37 Cr 4	
		46 Cr2	
10.9	to M6	35B2	10B35/1035
		Cq 35	
	over M6 to M18	34 Cr 4	5132/5140
		41 Cr 4	
	to M39	41 Cr 4	5135/4137/4140
		34 CrMo 4	
		42 CrMo 4	
12.9	to M18	34 CrMo4	4137/5135/5140
		37 Cr 4	
		41 Cr 4	
	to M24	42CrMo 4	4140
	to M39	34 CrNiMo 6	4340