Preloads and tightening torques of screwed fastenings from steel with locking elements

Table 9: Typical values for preloads F_V and tightening torques for screws and nuts with lock ribs under the flange
(R264 - ARTICLEs 88913 and 88914**)**

Material of screwed part	Property class 100/10													
	M 5		M 6		M 8		M 10		M 12		M 14x1.5		M 16	
	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]
Steel R_m < 800 MPa		11		19		42		85		130		250		330
Steel R_m ≥ 800 MPa	9000	10	12600	18	23200	37	37000	80	54000	120	74000	240	102000	310
malleable cast iron		9		16		35		75		115		230		300

Table 10: Typical values for preloads F_V and tightening torques F_V for hexagon socket cap screws with lock ribs under the flange
(R264 - ARTICLEs 88912**)**

Material of screwed part	Property class 100/10									
	M 5		M 6		M 8		M 10		M 12	
	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]
Steel R_m < 800 MPa		13		24		45		90		150
Steel R_m ≥ 800 MPa	9000	11	12600	20	23200	42	37000	85	54000	140
malleable cast iron		10		19		39		80		120

Table 11: Typical values for preloads and tightening torques of locking screws and nuts
(R264 - ARTICLEs 88933 and 88934)

Material of screwed part	Property class 100/10								Property class 100/10			
	M 5		M 6		M 8		M 10		M 12		M 16	
	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]	F_V [N]	M_A [Nm]
Steel	6350	9	9000	16	16500	34	26200	58	54000	120	102000	280
malleable cast iron		7		13		28		49		105		260

Table 12: Typical values for tightening torques and prestressing forces of screwed fastenings with NORD-LOCK washers
(R264 - ARTICLE 88132)

NL washers for threads	Preloads F_V (kN) for property class					Tightening torque M_A (Nm) for property class				
	8.8 [1]	10.9 [2]	12.9 [3]	A 4-70 [4]	A 4-80 [4]	8.8 [1]	10.9 [2]	12.9 [3]	A 4-70 [4]	A 4-80 [4]
M 4	3.5	5.9	7.1	2.6	3.4	3.1	4.1	4.6	2.0	2.7
M 5	5.6	9.6	11.5	4.1	5.5	6	8.1	9.1	3.9	5.3
M 6	8.0	13.6	16.3	5.9	7.8	10.2	14.1	15.8	6.9	9.2
M 8	15	25	30	11	14	25	34	38	17	22
M 10	23	39	47	17	23	50	67	75	33	43
M 12	33	57	68	25	33	85	115	128	56	75
M 14	46	78	94	34	45	136	183	204	89	119
M 16	62	106	127	46	61	208	279	311	136	181
M 18	76	130	156	56	75	291	391	437	191	254
M 20	97	165	198	72	95	408	547	610	267	356
M 22	120	205	246	89	118	557	745	831	364	485
M 24	140	238	286	103	137	703	942	1052	460	613
M 27	182	310	372	134	179	1028	1375	1533	671	895
M 30	222	378	454	164	219	1401	1875	2091	915	1220
M 33	275	468	562	-	-	1889	2526	2815	-	-
M 36	324	551	662	239	319	2436	3259	3633	1591	2121
M 39	387	659	790	-	-	3145	4203	4683	-	-
M 42	445	757	908	-	-	3890	5202	5799	-	-

Source: www.nordlock.com

1) Screw zinc plated, dry, thread friction μ_G = 0.15, friction coefficient of the lock washer μ_W = 0.18, utilisation of the minimum yield strength = 62%
2) Screw uncoated, oiled, thread friction μ_G = 0.13, friction coefficient of the lock washer μ_W = 0.14, utilisation of the minimum yield strength = 71%
3) Screw uncoated, oiled, thread friction μ_G = 0.13, friction coefficient of the lock washer μ_W = 0.12, utilisation of the minimum yield strength = 71%
4) Screw lubricated with graphite paste, thread friction μ_G = 0.14, friction coefficient of the lock washer μ_W = 0.15, utilisation of the minimum yield strength = 65%

Table 13: Typical values for tightening torques of screwed fastenings with lock washers

R264 - ARTICLEs	Property class Screws	Tightening torque M_A in Nm													
		M 4	M 5	M 6	M 8	M 10	M 12	M 14	M 16	M 18	M 20	M 22	M 24	M 27	M 30
88123 type S	5.8	2.0	4.0	7.0	16.5	32	57	-	-	-	-	-	-	-	-
88124 type M	8.8	3.3	6.7	11.5	27	54	92	145	225	320	460	620	790	1160	1550
	10.9	4.9	9.8	16.5	40	79	135	215	330	460	650	890	1120	1650	2250
88125 type B	10.9	-	-	16.5	40	79	135	-	-	-	-	-	-	-	-
	12.9	-	-	19.5	47	92	158	-	-	-	-	-	-	-	-

Source: www.teckentrup.de

Typical values for tightening torques of screwed fastenings with SCHNORR washers
R264 - ARTICLE 88120 and R264 - ARTICLE 88121: As a typical value, 10% should be added to the normal tightening torque, M_A according to TI-177, Tables 4 and 5.