

NORD-LOCK®

Bolt securing system

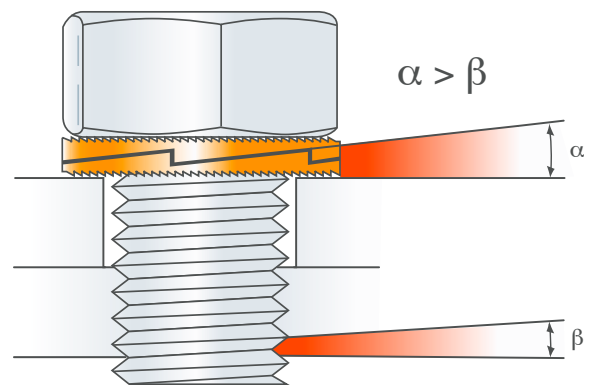


Technical information

A closer look

NORD-LOCK's proven wedge-locking method meeting DIN 25201 utilizes tension instead of friction to secure a bolted joint, making it superior to traditional methods.

The NORD-LOCK bolt securing system incorporates a pair of washers that have cam faces on one side with the cam angle " α " greater than the thread pitch " β ". In addition, there are radial teeth on the opposite sides. The pre-assembled washers are installed in pairs, cam face to cam face.



When the bolt and/or nut is tightened the teeth of the NORD-LOCK washers grip and lock the mating surfaces, allowing movement only across the cam faces. Any rotation of the bolt/nut is blocked by the wedge effect of the cams.

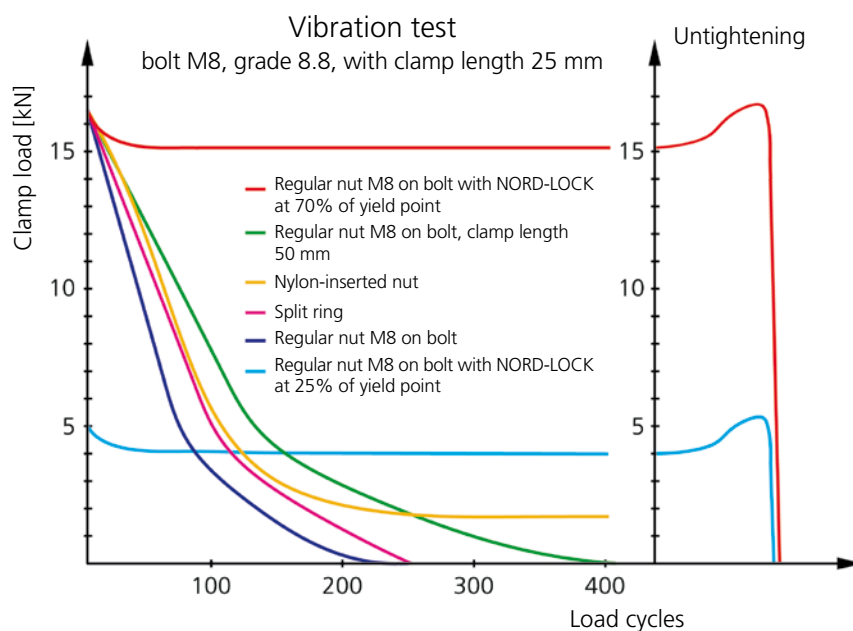


The talent behind the curves

Working together with us can optimize your applications. Put your bolted joints to the test simulating a worst-case scenario. At our in-house laboratory we run vibration tests and measure torque-load ratios.

The Junker vibration test meeting DIN 65151 is an excellent method for testing and comparing the security of bolted joints. In a Junker test the bolted joint is subjected to transverse movements while the tension is being continuously measured by a load cell.

The diagram displays NORD-LOCK's superior performance. Most of the commonly used locking devices show limited holding performance when exposed to vibration. Whereas, bolted joints secured with NORD-LOCK washers only lose some of the initial preload due to normal settlements between the contact surfaces. NORD-LOCK's unique wedge-locking function is proved by the clear increase in clamp load during untightening.



The unique wedge-locking action of the NORD-LOCK washers can easily be verified. Tighten a bolted joint with NORD-LOCK, then untighten. During untightening, sliding must always occur between the cam faces of the washers. Upon overriding of the cams a "click effect" should be felt when the nut/bolt comes loose. Visual inspection of the mating surfaces should show clear impression marks made by the radial teeth of the washers. When these criteria are met, NORD-LOCK washers will safely lock bolted joints exposed to severe vibration and dynamic loads.

High quality material

NORD-LOCK washers are available in a variety of materials, which all comply with European directives on ELV & RoHS.

Our standard steel washers are coated with the zinc flake coating Delta Protekt®. The process includes a base and top coat.

Zinc flake coated NORD-LOCK washers endure a minimum of 600 hours of salt spray testing in accordance with ISO 9227. The image to the right shows a sample of zinc flake coated NL24 washers after 1000 hours of salt spray testing.



NORD-LOCK steel washers are made of EN 1.7182 or equivalent alloy. All steel washers are through hardened.

NORD-LOCK stainless steel washers (A4) are made of EN 1.4404 (US standard AISI 316L) or equivalent alloy. All stainless steel washers are surface hardened.

Other steel alloys available on request

254SMO - for highly corrosive environments - made of EN 1.4547 or equivalent alloy

INCONEL® 718 - for high temperature environments - made of EN 2.4668 or equivalent alloy

INCONEL®/HASTELLOY® C-276 - for acid environments - made of EN 2.4819 or equivalent alloy

Hardness table

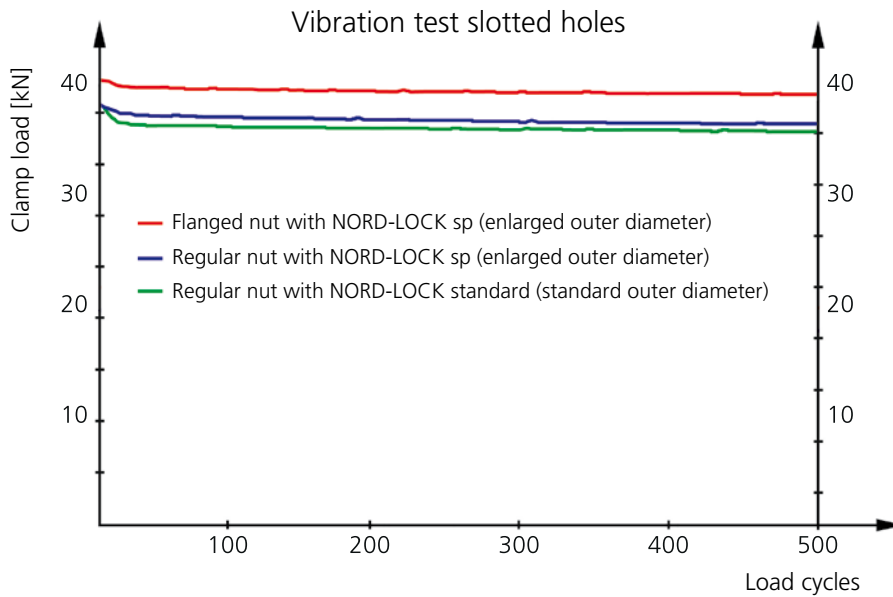
Material	Range	Zinc flake coated (fIZnyc - 600)	Non-coated
Steel (through hardened)	NL3 – NL130	> 435 HV1	
Stainless steel A4 (surface hardened)	NL3 ss – NL80 ss		> 520 HV0.05

Please note: In order to assure the unique mechanical locking function of the NORD-LOCK washers, the hardness of the mating surfaces must be lower than the hardness of the NORD-LOCK washers (see table above).



Counter-bores & slots

NORD-LOCK's outer diameters are suitable for counter-bores. In addition, washers with enlarged outer diameter (sp) are available for use on large/slotted holes, painted surfaces or soft materials, e.g. aluminium. For optimum results use NORD-LOCK sp washers together with flanged nuts/bolts.



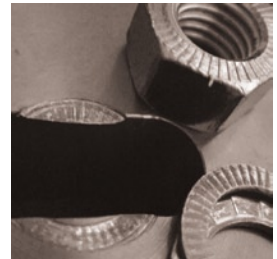
Example for Junker vibration of M12 bolt (8.8)



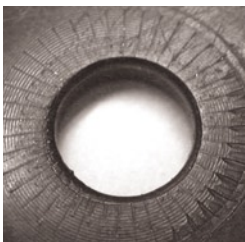
Flanged nut with NL sp (enlarged outer diameter)



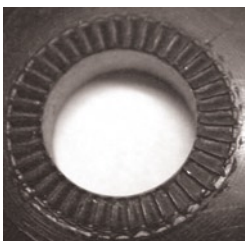
Regular nut with NL sp (enlarged outer diameter)



Regular nut with NL (standard outer diameter)



Painted surface after use of NORD-LOCK with enlarged outer diameter



Painted surface after use of NORD-LOCK with standard diameter

Painted surfaces

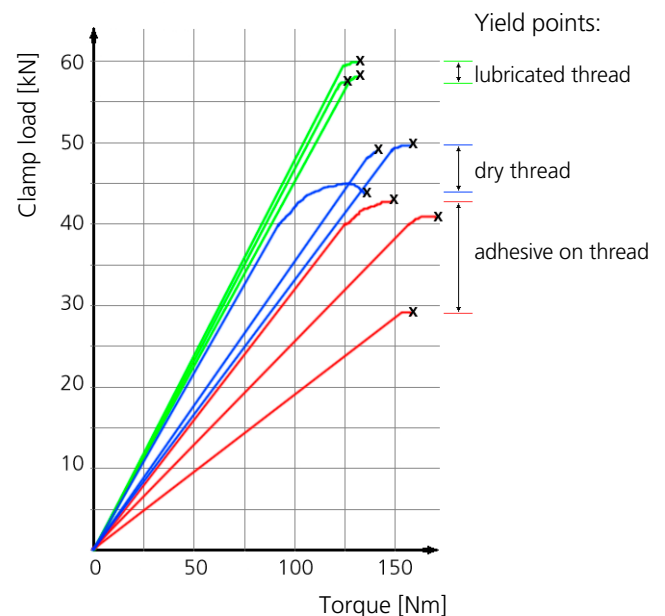
NORD-LOCK washers safely secure bolted joints on painted surfaces provided the washers' teeth properly impress into the painted mating surface. Upon untightening sliding will occur between the cam faces of the washers assuring the unique wedge-locking effect while avoiding any abrading of the painted surface.

Minimize torsional stress

During tightening, bolts are subjected to both tensile and torsional stress. The desired tensile stress (clamp load) is achieved when the bolt is axially elongated. Unwanted torsional stress (twisting) in bolts arises during tightening due to friction between the contact surfaces in the threads. High thread friction increases twisting of the bolts and causes yielding at lower clamp load levels than normal.

Applying an adhesive significantly increases thread friction during tightening. The graph to the right shows that when tightening bolts with adhesives on the threads, only half as much clamp load was obtained before reaching the yield points compared to when tightening similar bolts lubricated. Since NORD-LOCK's unique wedge-locking technique is not affected by lubrication, the thread friction, and thereby also the torsional stress, can be minimized.

In addition, the diagram shows that at any given torque value the clamp load deviation for lubricated bolts secured by NORD-LOCK is very low. NORD-LOCK offers safe locking for bolted joints at the highest possible preload level.



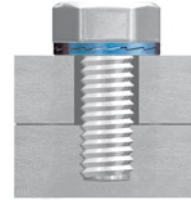
Example of a torque-load diagram for M12 bolt (8.8)



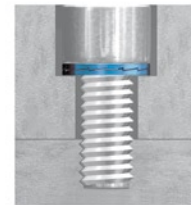


NORD-LOCK washers can be used with standard and high grade bolts.

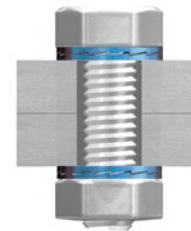
NORD-LOCK for tapped holes.



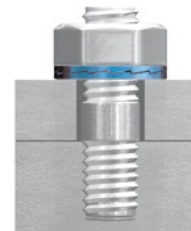
NORD-LOCK washers are sized for counter-bores.



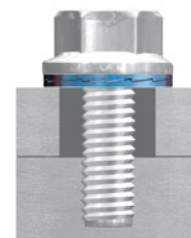
Through holes require two pairs of NORD-LOCK.



For stud bolts NORD-LOCK washers lock the nut, and eliminate the need for adhesives.



Use a flanged nut/bolt together with NORD-LOCK "sp" washers for slotted holes or on soft material.



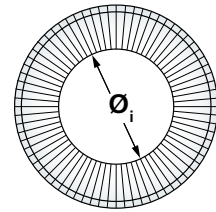
NORD-LOCK washers must not be used on washers that are not captivated in place.



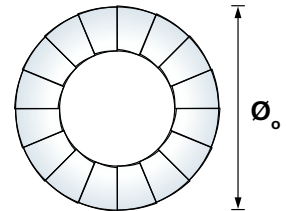
NORD-LOCK washer dimensions UNC - preassembled pairs

STEEL, ZINC FLAKE COATED (DELTA PROTEKT®) - ELV & RoHS COMPLIANT

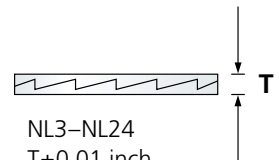
Washer size	Bolt size UNC	Metric	ϕ_i [inch]	ϕ_o [inch]	Thickness T [inch]	Min. package [pairs]	Approx. weight lbs/100 pairs
NL3	#5	M3	0.13	0.28	0.07	200	0.09
NL3.5	#6	M3.5	0.15	0.30	0.07	200	0.07
NL3.5 sp	#6	M3.5	0.15	0.35	0.07	200	0.13
NL4	#8	M4	0.17	0.30	0.07	200	0.09
NL4 sp	#8	M4	0.17	0.35	0.07	200	0.13
NL5	#10	M5	0.21	0.35	0.07	200	0.11
NL5 sp	#10	M5	0.21	0.43	0.07	200	0.24
NL6		M6	0.26	0.43	0.07	200	0.15
NL6 sp		M6	0.26	0.53	0.10	200	0.44
NL1/4"	1/4"		0.28	0.45	0.07	200	0.18
NL1/4" sp	1/4"		0.28	0.53	0.10	200	0.40
NL8	5/16"	M8	0.34	0.53	0.10	200	0.33
NL8 sp	5/16"	M8	0.34	0.65	0.10	200	0.64
NL3/8"	3/8"		0.41	0.65	0.10	200	0.51
NL3/8" sp	3/8"		0.41	0.83	0.10	200	1.01
NL10		M10	0.42	0.65	0.10	200	0.51
NL10 sp		M10	0.42	0.83	0.10	200	0.97
NL11	7/16"	M11	0.45	0.73	0.10	200	0.64
NL12		M12	0.51	0.77	0.10	200	0.64
NL12 sp		M12	0.51	1.00	0.13	100	2.01
NL1/2"	1/2"		0.53	0.77	0.10	200	0.60
NL1/2" sp	1/2"		0.53	1.00	0.13	100	2.05
NL14	9/16"	M14	0.60	0.91	0.13	100	1.39
NL14 sp	9/16"	M14	0.60	1.21	0.13	100	3.22
NL16	5/8"	M16	0.67	1.00	0.13	100	1.52
NL16 sp	5/8"	M16	0.67	1.21	0.13	100	2.84
NL18		M18	0.77	1.14	0.13	100	1.87
NL18 sp		M18	0.77	1.36	0.13	100	3.48
NL3/4"	3/4"		0.79	1.21	0.13	100	2.31
NL3/4" sp	3/4"		0.79	1.54	0.13	100	4.85
NL20		M20	0.84	1.21	0.13	100	2.09
NL20 sp		M20	0.84	1.54	0.13	100	4.48
NL22	7/8"	M22	0.92	1.36	0.13	100	2.84
NL22 sp	7/8"	M22	0.92	1.65	0.18	50	7.30
NL24		M24	1.00	1.54	0.13	100	3.70
NL24 sp		M24	1.00	1.91	0.18	50	9.94
NL1"	1"		1.10	1.54	0.13	100	3.37
NL1" sp	1"		1.10	1.91	0.18	50	9.26
NL27		M27	1.12	1.65	0.26	50	7.25
NL27 sp		M27	1.12	1.91	0.26	25	11.88
NL30	1 1/8"	M30	1.24	1.85	0.26	50	9.26
NL30 sp	1 1/8"	M30	1.24	2.30	0.26	25	19.75
NL33	1 1/4"	M33	1.35	1.91	0.26	25	8.75
NL33 sp	1 1/4"	M33	1.35	2.30	0.26	25	18.32
NL36	1 3/8"	M36	1.47	2.17	0.26	25	12.32
NL36 sp	1 3/8"	M36	1.47	2.48	0.26	25	20.17
NL39	1 1/2"	M39	1.59	2.30	0.26	25	13.85
NL42		M42	1.70	2.48	0.26	25	16.46
NL45	1 3/4"	M45	1.82	2.76	0.28	25 *	22.49
NL48		M48	1.95	2.95	0.28	25 *	26.46
NL52	2"	M52	2.11	3.15	0.28	25 *	28.66
NL56	2 1/4"	M56	2.33	3.35	0.28	10 *	29.76
NL60		M60	2.48	3.54	0.37	1 *	51.76
NL64	2 1/2"	M64	2.64	3.74	0.37	1 *	56.83
NL68		M68	2.80	3.94	0.37	1 *	62.15
NL72		M72	2.96	4.13	0.37	1 *	67.68
NL76	3"	M76	3.11	4.33	0.37	1 *	73.43
NL80		M80	3.27	4.53	0.37	1 *	79.41
NL85		M85	3.47	4.72	0.37	1 *	83.42
NL90		M90	3.64	5.12	0.37	1 *	105.09
NL95		M95	3.83	5.31	0.37	1 *	109.81
NL100		M100	4.07	5.71	0.37	1 *	129.87
NL105		M105	4.27	5.91	0.37	1 *	135.10
NL110		M110	4.46	6.10	0.37	1 *	140.32
NL115		M115	4.66	6.50	0.37	1 *	165.96
NL120		M120	4.86	6.69	0.37	1 *	171.83
NL125		M125	5.06	6.81	0.37	1 *	168.94
NL130		M130	5.25	7.01	0.37	1 *	174.54



NL3–NL8
 $\phi_i \pm 0.004$ inch
 NL10–NL42
 $\phi_i \pm 0.008$ inch
 NL45–NL130
 $\phi_i +0.02/-0$ inch



NL3–NL24
 $\phi_o \pm 0.008$ inch
 NL27–NL42
 $\phi_o \pm 0.012$ inch
 NL45–NL130
 $\phi_o +0/-0.08$ inch



NL3–NL24
 $T \pm 0.01$ inch
 NL27–NL42
 $T +0/-0.02$ inch
 NL45–NL130
 $T \pm 0.03$ inch

* NL45–NL130
 upon inquiry

Materials and dimensions are subject to change without prior notice.

Please consult our website for current dimensions:

www.nord-lock.com

Torque guidelines [ftlb]

NORD-LOCK zinc flake coated (DP = Delta Protekt®) washers with electro zinc plated **bolt (grade 5)**

Washer size	Bolt size	Pitch [TPI]	Oil, $G_F=0,75$ $\mu_g=0,10, \mu_w=0,16$		GTP600, $G_F=0,75$ $\mu_g=0,08, \mu_w=0,15$		Dry, $G_F=0,62$ $\mu_g=0,15, \mu_w=0,18$	
			Torque [ftlb]	Clamp load [lb]	Torque [ftlb]	Clamp load [lb]	Torque [ftlb]	Clamp load [lb]
NL3	#5	40	1.1	550	1.0	550	1.1	450
NL3.5	#6	32	1.4	630	1.3	630	1.5	520
NL4	#8	32	2.7	970	2.4	970	2.6	800
NL5	#10	24	3.9	1,200	3.5	1,200	4.0	1,000
NL1/4"	1/4	20	9.1	2,200	8.3	2,200	9.0	1,800
NL8	5/16	18	18	3,600	16	3,600	18	3,000
NL3/8"	3/8	16	30	5,400	28	5,400	31	4,400
NL11	7/16	14	47	7,300	42	7,300	47	6,100
NL1/2"	1/2	13	73	9,800	66	9,800	74	8,100
NL14	9/16	12	104	12,600	94	12,600	104	10,400
NL16	5/8	11	145	15,600	131	15,600	146	12,900
NL3/4"	3/4	10	254	23,100	230	23,100	257	19,100
NL22	7/8	9	408	31,900	369	31,900	413	26,400
NL1"	1	8	617	41,800	557	41,800	624	34,600
NL30	1 1/8	7	771	46,400	697	46,400	780	38,400
NL33	1 1/4	7	1075	58,900	969	58,900	1090	48,700
NL36	1 3/8	6	1410	70,200	1270	70,200	1430	58,100
NL39	1 1/2	6	1860	85,500	1670	85,500	1880	70,600



Torque guidelines for other bolt grades are available on request through your local NORD-LOCK representative.

GTP600 = graphite lubricant

G_F = ratio of yield point

μ_g = thread friction

μ_w = washer friction

NORD-LOCK Delta Protekt® with non-plated **bolt (grade 8)**

Washer size	Bolt size	Pitch [TPI]	Oil, $G_F=0,71$ $\mu_g=0,13, \mu_w=0,14$		GTP600, $G_F=0,75$ $\mu_g=0,08, \mu_w=0,13$	
			Torque [ftlb]	Clamp load [lb]	Torque [ftlb]	Clamp load [lb]
NL3	#5	40	1.5	740	1.3	780
NL3.5	#6	32	1.9	840	1.7	890
NL4	#8	32	3.5	1,300	3.1	1,400
NL5	#10	24	5.1	1,600	4.6	1,700
NL1/4"	1/4	20	12	2,900	11	3,100
NL8	5/16	18	24	4,900	21	5,100
NL3/8"	3/8	16	41	7,200	36	7,600
NL11	7/16	14	64	9,800	56	10,400
NL1/2"	1/2	13	99	13,100	86	13,900
NL14	9/16	12	138	16,800	122	17,800
NL16	5/8	11	197	20,900	171	22,100
NL3/4"	3/4	10	346	30,900	299	32,700
NL22	7/8	9	556	42,700	479	45,100
NL1"	1	8	840	56,000	724	59,200
NL30	1 1/8	7	1190	70,600	1030	74,500
NL33	1 1/4	7	1660	89,600	1430	94,600
NL36	1 3/8	6	2180	107,000	1880	113,000
NL39	1 1/2	6	2870	130,000	2470	137,000

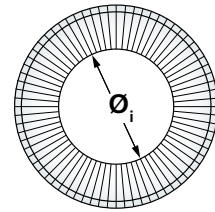
NORD-LOCK Delta Protekt® with **ASTM A574 bolt, (high-grade)**

Washer size	Bolt size	Pitch [TPI]	Oil, $G_F=0,71$ $\mu_g=0,13, \mu_w=0,12$		GTP600, $G_F=0,75$ $\mu_g=0,08, \mu_w=0,11$	
			Torque [ftlb]	Clamp load [lb]	Torque [ftlb]	Clamp load [lb]
NL3	#5	40	1.7	870	1.6	910
NL3.5	#6	32	2.2	990	2.0	1,050
NL4	#8	32	3.8	1,500	3.7	1,600
NL5	#10	24	5.8	1,900	5.5	2,000
NL1/4"	1/4	20	13	3,400	12	3,700
NL8	5/16	18	26	5,700	23	6,000
NL3/8"	3/8	16	45	8,400	39	8,900
NL11	7/16	14	70	11,500	60	12,200
NL1/2"	1/2	13	109	15,400	93	16,300
NL14	9/16	12	148	19,800	141	20,900
NL16	5/8	11	216	24,600	184	26,000
NL3/4"	3/4	10	378	36,400	321	38,400
NL22	7/8	9	607	50,200	514	53,000
NL1"	1	8	916	65,900	776	69,600
NL30	1 1/8	7	1300	83,000	1100	87,700
NL33	1 1/4	7	1810	105,000	1530	111,000
NL36	1 3/8	6	2380	126,000	2020	133,000
NL39	1 1/2	6	3140	153,000	2640	161,000

NORD-LOCK washer dimensions UNC - preassembled pairs

STAINLESS STEEL A4 (according to EN 1.4404, AISI 316L)

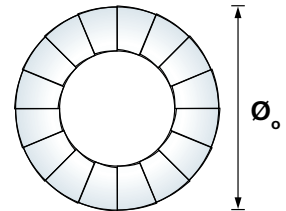
Washer size	Bolt size		\varnothing_i [inch]	\varnothing_o [inch]	Thickness T [inch]	Min. package [pairs]	Approx. weight lbs /100 pairs
	UNC	Metric					
NL3 ss	#5	M3	0.13	0.28	0.09	200	0.09
NL3.5 ss	#6	M3.5	0.15	0.30	0.09	200	0.09
NL3.5 sp ss	#6	M3.5	0.15	0.35	0.09	200	0.15
NL4 ss	#8	M4	0.17	0.30	0.09	200	0.09
NL4 sp ss	#8	M4	0.17	0.35	0.09	200	0.15
NL5 ss	#10	M5	0.21	0.35	0.09	200	0.13
NL5 sp ss	#10	M5	0.21	0.43	0.09	200	0.24
NL6 ss		M6	0.26	0.43	0.09	200	0.20
NL6 sp ss		M6	0.26	0.53	0.09	200	0.35
NL1/4" ss	1/4"		0.28	0.45	0.09	200	0.20
NL1/4" sp ss	1/4"		0.28	0.53	0.09	200	0.33
NL8 ss	5/16"	M8	0.34	0.53	0.09	200	0.26
NL8 sp ss	5/16"	M8	0.34	0.65	0.09	200	0.53
NL3/8" ss	3/8"		0.41	0.65	0.09	200	0.37
NL3/8" sp ss	3/8"		0.41	0.83	0.09	200	0.84
NL10 ss		M10	0.42	0.65	0.09	200	0.35
NL10 sp ss		M10	0.42	0.83	0.09	200	0.82
NL11 ss	7/16"	M11	0.45	0.73	0.09	200	0.57
NL12 ss		M12	0.51	0.77	0.09	200	0.55
NL12 sp ss		M12	0.51	1.00	0.13	100	1.79
NL1/2" ss	1/2"		0.53	0.77	0.09	200	0.53
NL1/2" sp ss	1/2"		0.53	1.00	0.13	100	1.76
NL14 ss	9/16"	M14	0.60	0.91	0.13	100	1.21
NL14 sp ss	9/16"	M14	0.60	1.21	0.13	100	2.89
NL16 ss	5/8"	M16	0.67	1.00	0.13	100	1.34
NL16 sp ss	5/8"	M16	0.67	1.21	0.13	100	2.84
NL18 ss		M18	0.77	1.14	0.13	100	1.76
NL18 sp ss		M18	0.77	1.36	0.13	100	3.44
NL3/4" ss	3/4"		0.79	1.21	0.13	100	2.12
NL3/4" sp ss	3/4"		0.79	1.54	0.13	100	4.63
NL20 ss		M20	0.84	1.21	0.13	100	1.96
NL20 sp ss		M20	0.84	1.54	0.13	100	4.54
NL22 ss	7/8"	M22	0.92	1.36	0.13	100	2.71
NL22 sp ss	7/8"	M22	0.92	1.65	0.13	50	4.92
NL24 ss		M24	1.00	1.54	0.13	100	3.35
NL24 sp ss		M24	1.00	1.91	0.13	50	7.72
NL1" ss	1"		1.10	1.54	0.13	100	3.13
NL1" sp ss	1"		1.10	1.91	0.13	50	7.10
NL27 ss		M27	1.12	1.65	0.27	50	7.61
NL27 sp ss		M27	1.12	1.91	0.27	25	12.89
NL30 ss	1 1/8"	M30	1.24	1.85	0.27	50	9.76
NL30 sp ss	1 1/8"	M30	1.24	2.30	0.27	25	21.01
NL33 ss	1 1/4"	M33	1.35	1.91	0.27	25	9.37
NL36 ss	1 3/8"	M36	1.47	2.17	0.27	25	13.13
NL39 ss	1 1/2"	M39	1.59	2.30	0.27	25	14.85
NL42 ss		M42	1.70	2.48	0.27	25	17.54
NL45 ss	1 3/4"	M45	1.82	2.76	0.35	1 *	34.83
NL48 ss		M48	1.95	2.95	0.35	1 *	39.68
NL52 ss	2"	M52	2.11	3.15	0.35	1 *	44.31
NL56 ss	2 1/4"	M56	2.33	3.35	0.35	1 *	46.96
NL60 ss		M60	2.48	3.54	0.35	1 *	51.81
NL64 ss	2 1/2"	M64	2.64	3.74	0.35	1 *	56.88
NL68 ss		M68	2.80	3.94	0.35	1 *	62.17
NL72 ss		M72	2.96	4.13	0.35	1 *	67.68
NL76 ss	3"	M76	3.11	4.33	0.35	1 *	73.41
NL80 ss		M80	3.27	4.53	0.35	1 *	79.37



NL3 ss–NL8 ss
 $\varnothing_i \pm 0.004$ inch

NL10 ss–NL42 ss
 $\varnothing_i \pm 0.008$ inch

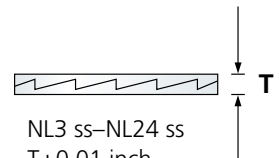
NL45 ss–NL80 ss
 $\varnothing_i +0.02/-0$ inch



NL3 ss–NL24 ss
 $\varnothing_o \pm 0.008$ inch

NL27 ss–NL42 ss
 $\varnothing_o \pm 0.012$ inch

NL45 ss–NL80 ss
 $\varnothing_o +0/-0.08$ inch



NL3 ss–NL24 ss
T ± 0.01 inch

NL27 ss–NL42 ss
T $+0/-0.02$ inch

NL45 ss–NL80 ss
T ± 0.03 inch

* NL45 ss–NL80 ss
upon inquiry

Materials and dimensions are subject to change without prior notice.

Please consult our website for current dimensions:

www.nord-lock.com

NL3 to NL24 available upon request in other steel alloys, e.g. 254SMO, Inconel® 718 and Inconel®/Hastelloy® C-276.

Torque guidelines [ftlb]

NORD-LOCK stainless steel (A4) washers with **ASTM F593 bolt** (stainless steel) lubricated with GTP600

Washer size	Bolt size	Pitch [TPI]	316, 316L, G _r =0,65 μ _g =0,14, μ _w =0,15		303, 304, 305, G _r =0,65 μ _g =0,14, μ _w =0,15	
			Torque [ftlb]	Clamp load [lb]	Torque [ftlb]	Clamp load [lb]
NL3	#5	40	-	-	-	-
NL3.5	#6	32	-	-	-	-
NL4	#8	32	-	-	-	-
NL5	#10	24	-	-	-	-
NL1/4"	1/4	20	5.2	1,300	5.2	1,300
NL8	5/16	18	10.3	2,200	10.3	2,200
NL3/8"	3/8	16	18	3,300	18	3,300
NL11	7/16	14	28	4,500	28	4,500
NL1/2"	1/2	13	43	6,000	43	6,000
NL14	9/16	12	61	7,700	61	7,700
NL16	5/8	11	85	9,500	85	9,500
NL3/4"	3/4	10	104	9,800	104	9,800
NL22	7/8	9	166	13,500	166	13,500
NL1"	1	8	251	17,700	251	17,700
NL30	1 1/8	7	356	22,300	356	22,300
NL33	1 1/4	7	497	28,300	497	28,300
NL36	1 3/8	6	653	33,800	653	33,800
NL39	1 1/2	6	859	41,100	859	41,100



GTP600 = graphite lubricant

G_r= ratio of yield point

μ_g = thread friction

μ_w = washer friction

1ft = 0,3048 m

1lb = 0,4536kg = 4,450 N

1ftlb = 0,3048 x 0,4536 x 9,81 = 1,356 Nm

Lubrication

NORD-LOCK recommends the use of a good lubricant (e.g. GTP600 or Molykote® 1000) in order to reduce friction, minimize preload deviation and protect against corrosion.

Reuse

NORD-LOCK washers can normally be reused. However, for high temperature applications, reuse is not recommended. Always lubricate fasteners before reusing!

Temperatures

NORD-LOCK washers have similar temperature characteristics as bolts/nuts of corresponding material. The hardness of NORD-LOCK steel washers decreases at temperatures above 200°C. Stainless steel (A4) washers start to degrade at temperatures above 500°C. For applications up to 700°C we recommend our INCONEL® 718 washers.

Calculation of load area

The load area [mm²] under the washer must be larger than the clamp load [N] divided by the yield point [N/mm²] of the material.

$$\text{Load area [mm}^2\text{]} > \frac{\text{Clamp load [N]}}{\text{Yield point [N/mm}^2\text{]}}$$

Design

2D & 3D models of all NORD-LOCK products can be found through www.nord-lock.com



NORD-LOCK®
Bolt securing system

AUTHORIZED DISTRIBUTOR

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