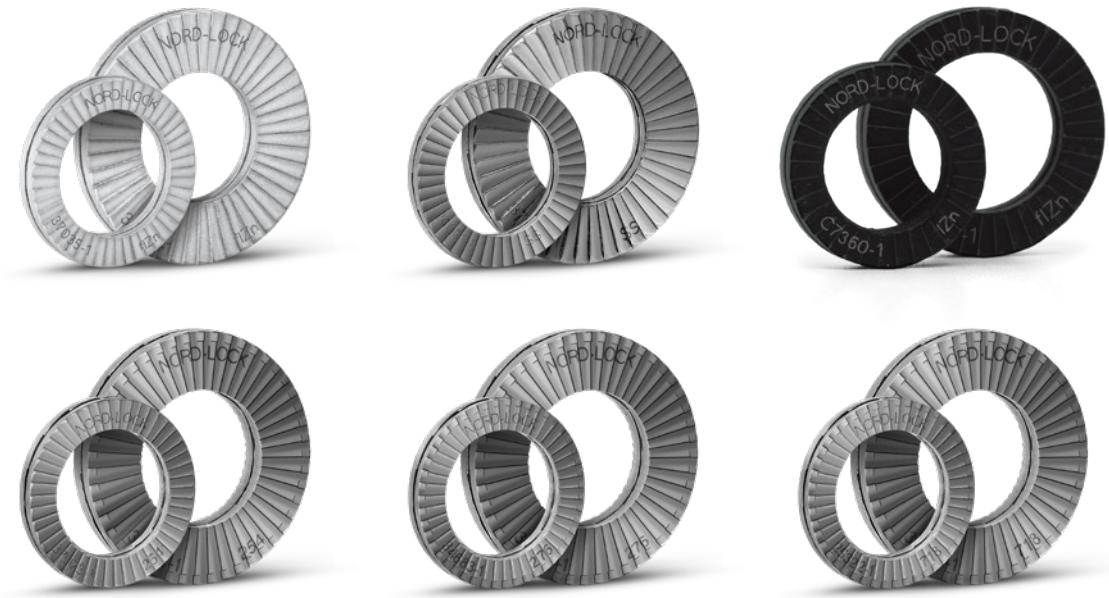
Nord-Lock Original Washers

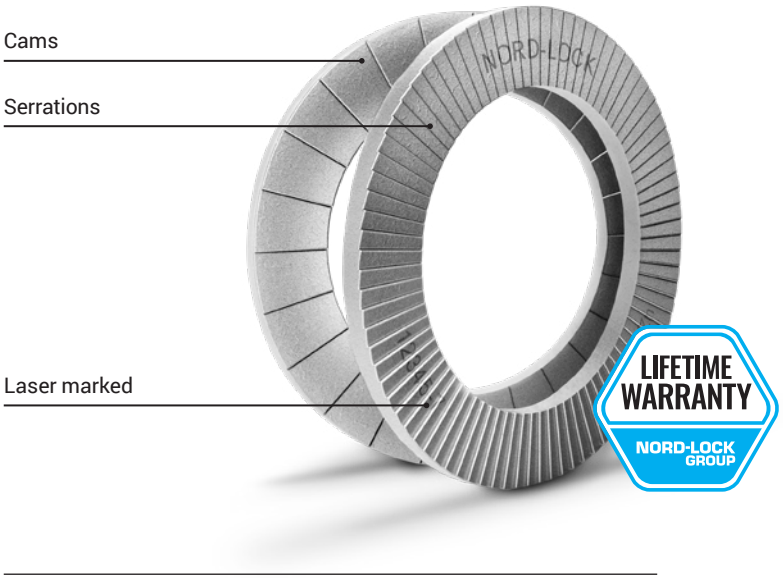
USER MANUAL



Nord-Lock Group
Tel: +46 40 602 46 00
Email: info@nord-lock.com
www.nord-lock.com

NORD-LOCK®
PART OF THE NORD-LOCK GROUP

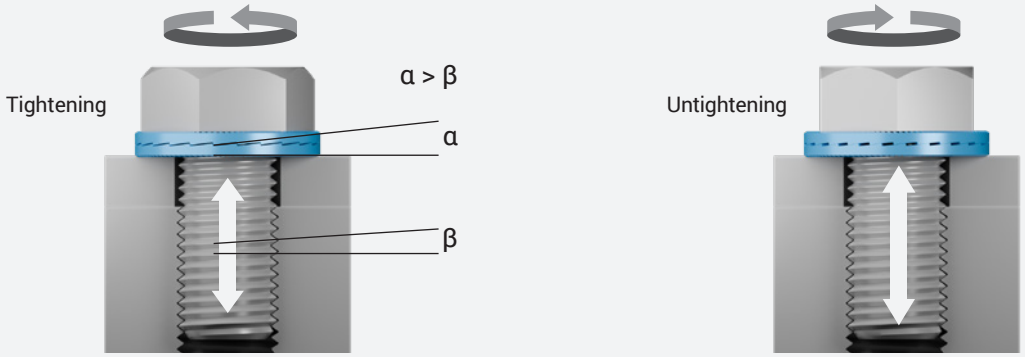
Prevents bolts from loosening



A pair of washers for maximum safety

Nord-Lock wedge-locking technology secures bolted joints with tension instead of friction. The system is composed of a pair of wedge-locking washers with cams on one side and serrations on the other. The pair of washers use cam-geometry to efficiently prevent the bolt from loosening.

How it works



Each washer pair has cam faces on one side and serrations on the other. When tightened, the serrations embed into the mating surfaces. As the cam angle (α) is greater than the thread pitch (β), a wedge effect is created, so movement only occurs across the cam faces – maintaining preload and preventing loosening.

Joint Guide

Use this guide to help you use Nord-Lock original washers correctly. If you have an application that does not meet our design criteria, contact us and we will help you find a solution.

Tapped holes

Nord-Lock washers safely lock the bolt against the underlying surface.

Through holes

Through holes require two pairs of Nord-Lock washers - one pair for securing the bolt and a second pair for securing the nut. Turn both fasteners in order to close the cams on both washer pairs before tightening to minimize settlements. Keep the nut secure while tightening the bolt.

Stud bolts

Nord-Lock washers safely lock the nut on stud bolts and eliminate the need for adhesives.

Counterbores

The outer diameter of regular Nord-Lock washers is designed for counterbore holes according to DIN 974.

Applications with large / slotted holes or soft underlying surfaces

To optimize the load distribution for applications with large or slotted holes or with soft underlying surface, use a flanged nut or bolt together with Nord-Lock “sp” washers with enlarged outer diameter.

For soft underlying surfaces or materials with a lot of settlements, for example composite material, it is also recommended to use Nord-Lock X-series washers.

Design where Nord-Lock washers are not recommended

- When mating surfaces are not locked in place
- When mating surfaces are harder than the washers
- With very soft mating surfaces — for example, wood and plastic
- For applications with extremely large settlements

Product Information

Nord-Lock offers products in a wide range of sizes, shapes and materials. They are developed to suit even the toughest environments. If you need support selecting the most appropriate product, please contact your closest Nord-Lock sales representative.

	STEEL	STAINLESS STEEL	254 SMO®	ALLOY C-276	ALLOY 718
Applications	General steel application	General stainless steel applications. Non chlorine / acid environments	General salt water applications, pumps, chloride applications, heat exchangers, nuclear, desalination, food processing & medical equipment	General acidic environments, process and chemical industry, evaporators, offshore downhole tooling	High temperatures — gas turbines, turbo charges, incinerators
Material Standard	EN 1.7182	EN 1.4404	EN 1.4547	EN 2.4819 or equivalent	EN 2.4668 or equivalent
Size Range	M3–M130 #5 to 5"	M3–M80 #5 to 3 1/8"	M3–M39 #5 to 1 1/2"	M4–M20 #8 to 1 1/2"	M4–M20 #8 to 1 1/2"
Corrosion Resistance**	Minimum 1,000 hours in salt spray test according to ISO 9227	PREN 27	PREN 45	PREN 68	PREN 29
Hardening	Through hardened	Surface hardened	Surface hardened	Surface hardened	Surface hardened
Washer hardness*	≥ 465HV1	≥ 520HV0.05	≥ 600HV0.05	≥ 520HV0.05	≥ 620HV0.05
Coating	Basecoat Delta Protekt® KL100, Topcoat VH 302 GZ Standard products in range M6-M24 are available with black coating	—	—	—	—
Bolt Grades	Up to 12.9	Up to A4-80	Up to A4-80	—	—
Temperature Range***	-50°C to 200°C	-160°C to 500°C	-160°C to 500°C	-160°C to 500°C	-160°C to 700°C
Product Designation	NL NLsp	NLss NLspss	NLss-254 NLspss-254	NLss-276 NLspss-276	NLss-718 NLspss-718
Laser Marking - Nord-Lock, traceable batch number and type code:	flZn	SS	254	276	718

*
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.

**
PREN (Pitting Resistance Equivalent Number) = %Cr + 3,3x%Mo + 16x%N. Figures in table valid for base material.

***
Temperature recommendations are based on information from the raw material supplier and testing. The locking function is not affected within the specified range.

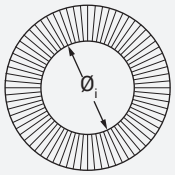
NORD-LOCK ORIGINAL STEEL WASHERS

DIMENSIONS

Delta Protekt® Zinc Flake Coating

Through hardened EN 1.7182

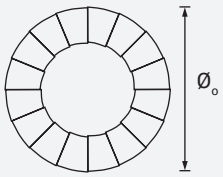
Delta Seal GZ top coat



NL3–NL8sp
Ø$_i$±0.1 mm

NL3/8"–NL42
Ø$_i$±0.2 mm

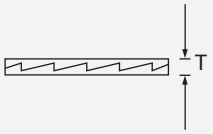
NL45–NL130
Ø$_i$+0.5 / -0.0 mm



NL3–NL1"sp
Ø$_o$±0.2 mm

NL27–NL42
Ø$_o$±0.3 mm

NL45–NL130
Ø$_o$+0.0 / -2.0 mm



NL3–NL42
T±0.25 mm

NL45–NL130
T±0.75 mm

Nord-Lock steel washers in sizes NL3–NL52 with zinc flake coating are standard stock items.

- Torque guidelines:
  Web app: torquelator.nord-lock.com
  www.nord-lock.com/torque

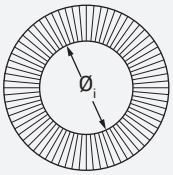
- 2D/3D CAD models:
  www.nord-lock.com/cad

Bolt size Metric	UNC	Product designation	Ø$_i$ [mm]	Ø$_o$ [mm]	Thickness T [mm]	Approx. weight kg/100 pairs	Min. Package [pairs]
M3	#5	NL3	3,4	7,0	1,8	0,03	200
M3.5	#6	NL3.5	3,9	7,6	1,8	0,04	200
M3.5	#6	NL3.5sp	3,9	9,0	1,8	0,06	200
M4	#8	NL4	4,4	7,6	1,8	0,04	200
M4	#8	NL4sp	4,4	9,0	1,8	0,06	200
M5	#10	NL5	5,4	9,0	1,8	0,05	200
M5	#10	NL5sp	5,4	10,8	1,8	0,11	200
M6		NL6	6,5	10,8	1,8	0,07	200
M6		NL6sp	6,5	13,5	2,5	0,20	200
	1/4"	NL1/4"	7,2	11,5	2,5	0,08	200
	1/4"	NL1/4"sp	7,2	13,5	2,5	0,18	200
M8	5/16"	NL8	8,7	13,5	2,5	0,15	200
M8	5/16"	NL8sp	8,7	16,6	2,5	0,28	200
	3/8"	NL3/8"	10,3	16,6	2,5	0,23	200
	3/8"	NL3/8"sp	10,3	21,0	2,5	0,48	200
M10		NL10	10,7	16,6	2,5	0,22	200
M10		NL10sp	10,7	21,0	2,5	0,47	200
M11	7/16"	NL11	11,4	18,5	2,5	0,29	200
M12		NL12	13,0	19,5	2,5	0,29	200
M12		NL12sp	13,0	25,4	3,4	0,93	100
	1/2"	NL1/2"	13,5	19,5	2,5	0,27	200
	1/2"	NL1/2"sp	13,5	25,4	3,4	0,90	100
M14	9/16"	NL14	15,2	23,0	3,4	0,56	100
M14	9/16"	NL14sp	15,2	30,7	3,4	1,41	100
M16	5/8"	NL16	17,0	25,4	3,4	0,67	100
M16	5/8"	NL16sp	17,0	30,7	3,4	1,28	100
M18		NL18	19,5	29,0	3,4	0,89	100
M18		NL18sp	19,5	34,5	3,4	1,58	100
	3/4"	NL3/4"	20,0	30,7	3,4	1,05	100
	3/4"	NL3/4"sp	20,0	39,0	3,4	2,21	100
M20		NL20	21,4	30,7	3,4	0,93	100
M20		NL20sp	21,4	39,0	3,4	2,09	100
M22	7/8"	NL22	23,4	34,5	3,4	1,25	100
M22	7/8"	NL22sp	23,4	42,0	4,6	3,19	50
M24		NL24	25,3	39,0	3,4	1,74	100
M24		NL24sp	25,3	48,5	4,6	4,51	50
	1"	NL1"	27,9	39,0	3,4	1,53	100
	1"	NL1"sp	27,9	48,5	4,6	4,20	50
M27		NL27	28,4	42,0	5,8	3,14	50
M27		NL27sp	28,4	48,5	5,8	5,27	25
M30	1 1/8"	NL30	31,4	47,0	5,8	4,10	50
M30	1 1/8"	NL30sp	31,4	55,0	5,8	7,00	25
M33	1 1/4"	NL33	34,4	48,5	5,8	3,89	25
M33	1 1/4"	NL33sp	34,4	58,5	5,8	8,00	25
M36	1 3/8"	NL36	37,4	55,0	5,8	5,49	25
M36	1 3/8"	NL36sp	37,4	63,0	5,8	8,58	25
M39	1 1/2"	NL39	40,4	58,5	5,8	5,89	25
M42		NL42	43,2	63,0	5,8	7,97	25
M45	1 3/4"	NL45	46,2	70,0	7,0	10,20	25
M48		NL48	49,6	75,0	7,0	12,00	25
M52	2"	NL52	53,6	80,0	7,0	13,00	25
M56	2 1/4"	NL56	59,1	85,0	7,0	13,50	10
M60		NL60	63,1	90,0	7,0	15,20	10
M64	2 1/2"	NL64	67,1	95,0	7,0	16,70	10
M68		NL68	71,1	100,0	9,5	28,20	1
M72		NL72	75,1	105,0	9,5	30,70	1
M76	3"	NL76	79,1	110,0	9,5	33,30	1
M80	3 1/8"	NL80	83,1	115,0	9,5	36,00	1
M85		NL85	88,1	120,0	9,5	37,80	1
M90		NL90	92,4	130,0	9,5	47,70	1
M95		NL95	97,4	135,0	9,5	49,80	1
M100	4"	NL100	103,4	145,0	9,5	58,90	1
M105		NL105	108,4	150,0	9,5	61,30	1
M110		NL110	113,4	155,0	9,5	63,50	1
M115		NL115	118,4	165,0	9,5	75,30	1
M120		NL120	123,4	170,0	9,5	77,90	1
M125		NL125	128,4	173,0	9,5	76,60	1
M130	5"	NL130	133,4	178,0	9,5	79,20	1

NORD-LOCK ORIGINAL STAINLESS STEEL WASHERS

DIMENSIONS

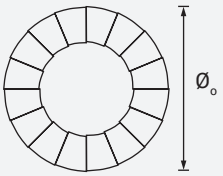
Surface hardened EN 1.4404
(AISI 316L)



NL3ss–NL8spss
Ø$_i$ ±0.1 mm

NL3/8"ss–NL42ss
Ø$_i$ ±0.2 mm

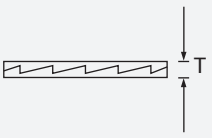
NL45ss–NL80ss
Ø$_i$ +0.5 / -0.0 mm



NL3ss–NL1"spss
Ø$_o$ ± 0.2 mm

NL27ss–NL42ss
Ø$_o$ ± 0.3 mm

NL45 ss–NL80ss
Ø$_o$ +0.0 / -2.0 mm



NL3ss–NL1"spss
T ± 0.25 mm

NL27ss–NL42ss
T+0.0 / -0.5 mm

NL45ss–NL80ss
T ± 0.75 mm

EN 1.4404 is a commonly used stainless steel known for its good corrosion resistance in general-purpose applications. Nord-Lock washers made from EN 1.4404 are a reliable choice for environments where chlorides and acids are not present.

Nord-Lock washers made of stainless steel are standard stock items.

- Torque guidelines:
  Web app: torquelator.nord-lock.com
  www.nord-lock.com/torque

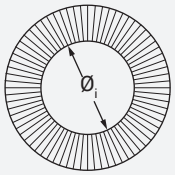
- 2D/3D CAD models:
  www.nord-lock.com/cad

Bolt size Metric	Bolt size UNC	Product designation	Ø$_i$ [mm]	Ø$_o$ [mm]	Thickness T [mm]	Approx. weight kg/100 pairs	Min. Package [pairs]
M3	#5	NL3ss	3,4	7,0	2,2	0,04	200
M3.5	#6	NL3.5ss	3,9	7,6	2,2	0,04	200
M3.5	#6	NL3.5spss	3,9	9,0	2,2	0,07	200
M4	#8	NL4ss	4,4	7,6	2,2	0,04	200
M4	#8	NL4spss	4,4	9,0	2,2	0,07	200
M5	#10	NL5ss	5,4	9,0	2,2	0,06	200
M5	#10	NL5spss	5,4	10,8	2,2	0,11	200
M6		NL6ss	6,5	10,8	2,2	0,09	200
M6		NL6spss	6,5	13,5	2,1	0,16	200
	1/4"	NL1/4"ss	7,2	11,5	2,2	0,09	200
	1/4"	NL1/4"spss	7,2	13,5	2,2	0,15	200
M8	5/16"	NL8ss	8,7	13,5	2,0	0,12	200
M8	5/16"	NL8spss	8,7	16,6	2,2	0,23	200
	3/8"	NL3/8"ss	10,3	16,6	2,0	0,19	200
	3/8"	NL3/8"spss	10,3	21,0	2,0	0,38	200
M10		NL10ss	10,7	16,6	2,0	0,18	200
M10		NL10spss	10,7	21,0	2,3	0,37	200
M11	7/16"	NL11ss	11,4	18,5	2,2	0,26	200
M12		NL12ss	13,0	19,5	2,1	0,23	200
M12		NL12spss	13,0	25,4	3,0	0,82	100
	1/2"	NL1/2"ss	13,5	19,5	2,0	0,22	200
	1/2"	NL1/2"spss	13,5	25,4	3,2	0,80	100
M14	9/16"	NL14ss	15,2	23,0	3,0	0,49	100
M14	9/16"	NL14spss	15,2	30,7	3,2	1,31	100
M16	5/8"	NL16ss	17,0	25,4	3,0	0,59	100
M16	5/8"	NL16spss	17,0	30,7	3,2	1,13	100
M18		NL18ss	19,5	29,0	3,2	0,80	100
M18		NL18spss	19,5	34,5	3,2	1,56	100
	3/4"	NL3/4"ss	20,0	30,7	3,2	0,96	100
	3/4"	NL3/4"spss	20,0	39,0	3,2	2,10	100
M20		NL20ss	21,4	30,7	3,0	0,82	100
M20		NL20spss	21,4	39,0	3,2	2,06	100
M22	7/8"	NL22ss	23,4	34,5	3,2	1,23	100
M22	7/8"	NL22spss	23,4	42,0	3,2	2,22	50
M24		NL24ss	25,3	39,0	3,2	1,59	100
M24		NL24spss	25,3	48,5	4,5	4,47	50
	1"	NL1"ss	27,9	39,0	3,2	1,42	100
	1"	NL1"spss	27,9	48,5	3,2	2,79	50
M27		NL27ss	28,4	42,0	6,8	3,45	50
M27		NL27spss	28,4	48,5	6,8	5,34	25
M30	1 1/8"	NL30ss	31,4	47,0	6,8	4,49	50
M30	1 1/8"	NL30spss	31,4	58,5	6,8	9,18	25
M33	1 1/4"	NL33ss	34,4	48,5	6,8	4,28	25
M36	1 3/8"	NL36ss	37,4	55,0	6,8	5,96	25
M39	1 1/2"	NL39ss	40,4	58,5	6,8	6,74	25
M42		NL42ss	43,2	63,0	6,8	7,50	25
M45	1 3/4"	NL45ss	46,2	70,0	6,8	10,20	25
M48		NL48ss	49,6	75,0	6,8	12,00	25
M52	2"	NL52ss	53,6	80,0	9,0	18,04	1
M56	2 1/4"	NL56ss	59,1	85,0	9,0	21,30	1
M60		NL60ss	63,1	90,0	9,0	23,50	1
M64	2 1/2"	NL64ss	67,1	95,0	9,0	25,80	1
M68		NL68ss	71,1	100,0	9,0	28,20	1
M72		NL72ss	75,1	105,0	9,0	30,70	1
M76	3"	NL76ss	79,1	110,0	9,0	33,30	1
M80	3 1/8"	NL80ss	83,1	115,0	9,0	36,00	1

NORD-LOCK ORIGINAL 254 SMO® WASHERS

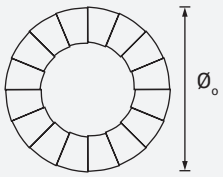
DIMENSIONS

Surface hardened EN 1.4547



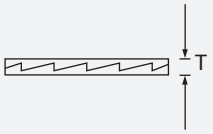
NL3ss-354
–NL8spss-254
Ø$_i$ ±0.1 mm

NL3/8"ss-254
–NL39ss-254
Ø$_i$ ±0.2 mm



NL3ss-254
–NL1"spss-254
Ø$_o$ ±0.2 mm

NL27ss-254
– NL39ss-254
Ø$_o$ ±0.3 mm



NL3ss-254
–NL39ss-254
T ±0.25 mm

254 SMO® is an austenitic stainless steel designed for maximum resistance to pitting and crevice corrosion. With high levels of chromium, molybdenum, and nitrogen, washers made from 254 SMO® are especially suited for:

- High chloride environments
- Salt water solutions/atmospheres
- Environments where stainless steel washers made of 1.4404 are not adequate

Nord-Lock washers made of 254 SMO® quality are standard stock items.

- Torque guidelines:
  Web app: torquelator.nord-lock.com
  www.nord-lock.com/torque

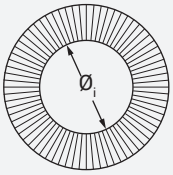
- 2D/3D CAD models:
  www.nord-lock.com/cad

Bolt size Metric	UNC	Product designation	Ø$_i$ [mm]	Ø$_o$ [mm]	Thickness T [mm]	Approx. weight kg/100 pairs	Min. package [pairs]
M3	#5	NL3ss-254	3,4	7,0	2,2	0,04	200
M3.5	#6	NL3.5ss-254	3,9	7,6	2,2	0,04	200
M3.5	#6	NL3.5spss-254	3,9	9,0	2,2	0,07	200
M4	#8	NL4ss-254	4,4	7,6	2,2	0,04	200
M4	#8	NL4spss-254	4,4	9,0	2,2	0,07	200
M5	#10	NL5ss-254	5,4	9,0	2,2	0,06	200
M5	#10	NL5spss-254	5,4	10,8	2,2	0,11	200
M6		NL6ss-254	6,5	10,8	2,2	0,09	200
M6		NL6spss-254	6,5	13,5	2,0	0,16	200
	1/4"	NL1/4"ss-254	7,2	11,5	2,2	0,09	200
	1/4"	NL1/4"spss-254	7,2	13,5	2,2	0,15	200
M8	5/16"	NL8ss-254	8,7	13,5	2,0	0,12	200
M8	5/16"	NL8spss-254	8,7	16,6	2,2	0,22	200
	3/8"	NL3/8"ss-254	10,3	16,6	2,0	0,19	200
	3/8"	NL3/8"spss-254	10,3	21,0	2,2	0,38	200
M10		NL10ss-254	10,7	16,6	2,0	0,18	200
M10		NL10spss-254	10,7	21,0	2,2	0,37	200
M11	7/16"	NL11ss-254	11,4	18,5	2,2	0,26	200
M12		NL12ss-254	13,0	19,5	2,0	0,23	200
M12		NL12spss-254	13,0	25,4	3,2	0,83	100
	1/2"	NL1/2"ss-254	13,5	19,5	2,0	0,23	200
	1/2"	NL1/2"spss-254	13,5	25,4	3,2	0,80	100
M14	9/16"	NL14ss-254	15,2	23,0	3,0	0,49	100
M14	9/16"	NL14spss-254	15,2	30,7	3,2	1,13	100
M16	5/8"	NL16ss-254	17,0	25,4	3,0	0,59	100
M16	5/8"	NL16spss-254	17,0	30,7	3,2	1,13	100
M18		NL18ss-254	19,5	29,0	3,2	0,80	100
M18		NL18spss-254	19,5	34,5	3,2	1,56	100
	3/4"	NL3/4"ss-254	20,0	30,7	3,2	0,96	100
	3/4"	NL3/4"spss-254	20,0	39,0	3,2	2,14	100
M20		NL20ss-254	21,4	30,7	3,0	0,83	100
M20		NL20spss-254	21,4	39,0	3,2	1,98	100
M22	7/8"	NL22ss-254	23,4	34,5	3,2	1,19	100
M22	7/8"	NL22spss-254	23,4	42,0	3,2	2,44	50
M24		NL24ss-254	25,3	39,0	3,2	1,65	100
M24		NL24spss-254	25,3	48,5	4,5	4,47	50
	1"	NL1"ss-254	27,9	39,0	3,2	1,42	100
	1"	NL1"spss-254	27,9	48,5	5,6	5,30	50
M27		NL27ss-254	28,4	42,0	5,8	3,10	50
M27		NL27spss-254	28,4	48,5	5,8	5,34	25
M30	1 1/8"	NL30ss-254	31,4	47,0	5,8	4,04	50
M33	1 1/4"	NL33ss-254	34,4	48,5	5,8	3,86	25
M36	1 3/8"	NL36ss-254	37,4	55,0	5,8	5,50	25
M39	1 1/2"	NL39ss-254	40,4	58,5	5,8	6,74	25

NORD-LOCK ORIGINAL ALLOY C-276 WASHERS

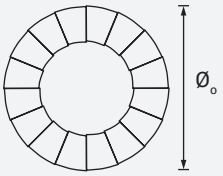
DIMENSIONS

Surface hardened EN 2.4819
or equivalent

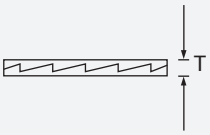


NL4ss-276
–NL8spss-276
Ø$_i$ ±0.1 mm

NL10ss-276
–NL20ss-276
Ø$_i$ ±0.2 mm



NL4ss-276
–NL20ss-276
Ø$_o$ ±0.2 mm



NL4ss-276
–NL12ss-276
T ±0.4 mm

NL12spss-276
–NL20ss-276
T ±0.5 mm

Bolt size Metric	UNC	Product designation	Ø$_i$ [mm]	Ø$_o$ [mm]	Thickness T [mm]	Approx. weight kg/100 pairs	Min. Package [pairs]
M4	#8	NL4ss-276	4.4	7.6	2.3	0.053	200
M5	#10	NL5ss-276	5.4	9.0	2.3	0.072	200
M6		NL6ss-276	6.5	10.8	2.3	0.104	200
M8	5/16"	NL8ss-276	8.7	13.5	2.3	0.151	200
M8	5/16"	NL8spss-276	8.7	16.6	2.3	0.281	200
M10		NL10ss-276	10.7	16.6	2.3	0.228	200
M10		NL10spss-276	10.7	21.0	2.3	0.457	200
M12		NL12ss-276	13.0	19.5	2.3	0.300	200
M12		NL12spss-276	13.0	25.4	3.0	0.962	100
M16	5/8"	NL16ss-276	17.0	25.4	3.0	0.726	100
M20		NL20ss-276	21.4	30.7	3.0	0.989	100

Washers made from Alloy C-276 are extremely corrosion resistant and are perfect for use in situations that demand protection from aggressive corrosion and localized corrosion attack. Therefore they are very suitable for use in chemical plants. Important features of this washer include its resistance to oxidizers such as:

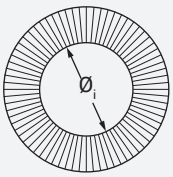
- Ferric and cupric chlorides
- Organic and inorganic hot contaminated media
- Chlorine (wet chlorine gas)
- Acids
- Hypochlorite
- Chlorine dioxide

2D/3D CAD models: www.nord-lock.com/cad

NORD-LOCK ORIGINAL ALLOY 718 WASHERS

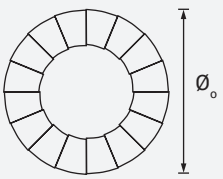
DIMENSIONS

Surface hardened EN 2.4668
or equivalent

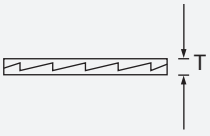


NL4ss-718
–NL8spss-718
Ø$_i$ +/-0.1 mm

NL3/8"ss-718
–NL20ss-718
Ø$_i$ +/-0.2 mm



NL4ss-718
–NL20ss-718
Ø$_o$ +/-0.2 mm



NL4ss-718
–NL12ss-718
(+ NL1/2"ss)
T +/-0.4 mm

NL12spss-718
–NL20ss-718
T +/-0.5 mm

Bolt size Metric	UNC	Product designation	Ø$_i$ [mm]	Ø$_o$ [mm]	Thickness T [mm]	Approx. weight kg/100 pairs	Min. Package [pairs]
M4	#8	NL4ss-718	4.4	7.6	2.3	0.049	200
M5	#10	NL5ss-718	5.4	9.0	2.3	0.066	200
M6		NL6ss-718	6.5	10.8	2.3	0.095	200
	1/4"	NL1/4"ss-718	7.2	11.5	2.3	0.103	200
M8	5/16"	NL8ss-718	8.7	13.5	2.3	0.139	200
M8	5/16"	NL8spss-718	8.7	16.6	2.3	0.259	200
	3/8"	NL3/8"ss-718	10.3	16.6	2.3	0.221	200
M10		NL10ss-718	10.7	16.6	2.3	0.210	200
M10		NL10spss-718	10.7	21.0	2.3	0.421	200
M12		NL12ss-718	13.0	19.5	2.3	0.277	200
M12		NL12spss-718	13.0	25.4	3.2	0.886	100
	1/2"	NL1/2"ss-718	13.5	19.5	2.3	0.259	200
M16	5/8"	NL16ss-718	17.0	25.4	3.2	0.669	100
	3/4"	NL3/4"ss-718	20.0	30.7	3.2	1.024	100
M20		NL20ss-718	21.4	30.7	3.2	0911	100

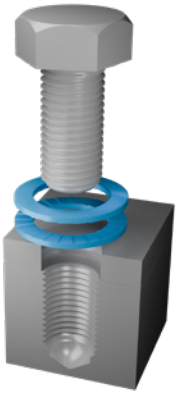
Washers made from Alloy 718 have exceptional high yield, tensile and creep-rupture properties at elevated temperatures, as well as corrosion resistance. Therefore these washers are the best choice for high temperature applications including:

- Jet engines
- Gas turbines
- Nuclear reactors
- Pumps

2D/3D CAD models: www.nord-lock.com/cad

Assembly Instructions

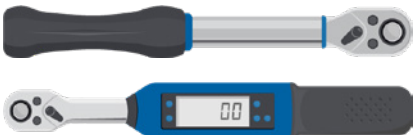
Tightening of threaded holes



1.

Place the pre-assembled washer pair on the bolt and (install) the bolt in the threaded hole.

We recommend the use of a lubricant. Lubricate the thread and the area under the head prior to installation.



2.

Tighten the bolt using a calibrated torque wrench. Check Nord-Lock's torque-guidelines for torque recommendations.

3.

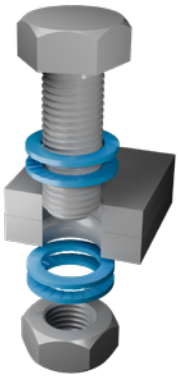
Ready!

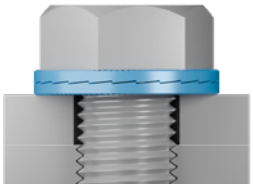
Tightening of through holes

1.

Place one pair of Nord-Lock washers underneath the head of the bolt and mount it in the through hole. Place the second pair of washers on the bolt and mount the nut.

We recommend the use of a lubricant. Lubricate the thread and the area under the head prior to installation.



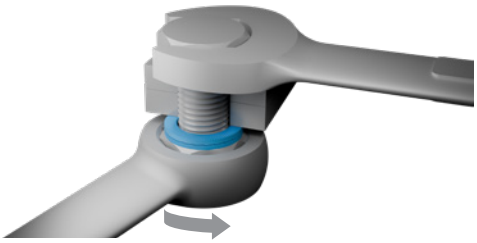


Closed cams - correct

Open cams – not correct

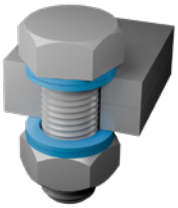
2.

Turn both fasteners (bolt head/nut) in order to close the cams on both washers before tightening to minimize settlements.



3.

Keep the bolt/nut secured while tightening the other part (bolt/nut). For guidance on which torque to tighten with, check the Nord-Lock torque guidelines.



4.

Ready!

Torque Guidelines

The below torque values have been verified in test laboratories and represent a configuration example. The values are indicative and should only be used as general guidelines as varying conditions, joint designs and requirements apply. The Nord-Lock Group provides customized torque calculations to any standard, free of charge.

Nord-Lock original steel washers with electro zinc plated bolt grade 8.8

Bolt size	Washer size	Pitch [mm]	Oil, G_F=75% μ_{th}=0.15, μ_h=0.19		Cu/C paste, G_F=75% μ_{th}=0.13, μ_h=0.18		Dry, G_F=62% μ_{th}=0.18, μ_h=0.2	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
M3	NL3	0.50	1.7	2.4	1.5	2.4	1.5	2.0
M4	NL4	0.70	3.8	4.2	3.6	4.2	3.5	3.5
M5	NL5	0.80	7.5	6.8	6.9	6.8	6.8	5.6
M6	NL6	1.00	13.0	9.7	12.1	9.7	12.0	8.0
M8	NL8	1.25	32.0	18.0	29.0	18.0	29.0	15.0
M10	NL10	1.50	62.0	28.0	57.0	28.0	56.0	23.0
M12	NL12	1.75	107.0	40.0	99.0	40.0	97.0	33.0
M14	NL14	2.00	170.0	55.0	157.0	55.0	155.0	46.0
M16	NL16	2.00	260.0	75.0	240.0	75.0	237.0	62.0
M18	NL18	2.50	364.0	92.0	336.0	92.0	331.0	76.0
M20	NL20	2.50	510.0	118.0	470.0	118.0	464.0	97.0
M22	NL22	2.50	696.0	146.0	642.0	146.0	634.0	120.0
M24	NL24	3.00	878.0	169.0	809.0	169.0	800.0	140.0
M27	NL27	3.00	1,284.0	221.0	1,183.0	221.0	1,172.0	182.0
M30	NL30	3.50	1,750.0	269.0	1,613.0	269.0	1,596.0	222.0
M33	NL33	3.50	2,360.0	333.0	2,173.0	333.0	2,155.0	275.0
M36	NL36	4.00	3,043.0	392.0	2,803.0	392.0	2,776.0	324.0
M39	NL39	4.00	3,931.0	468.0	3,619.0	468.0	3,589.0	387.0
M42	NL42	4.50	4,860.0	538.0	4,476.0	538.0	4,436.0	445.0

Nord-Lock original steel washers with non-plated bolt grade 10.9

Bolt size	Washer size	Pitch [mm]	Oil, G_F=71% μ_{th}=0.15, μ_h=0.15		Cu/C paste, G_F=75% μ_{th}=0.13, μ_h=0.15	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
M3	NL3	0.50	2.0	3.2	2.0	3.4
M4	NL4	0.70	4.5	5.6	4.5	5.9
M5	NL5	0.80	8.9	9.1	8.9	9.6
M6	NL6	1.00	15.5	12.9	15.5	13.6
M8	NL8	1.25	37.0	23.0	37.0	25.0
M10	NL10	1.50	73.0	37.0	73.0	39.0
M12	NL12	1.75	126.0	54.0	126.0	57.0
M14	NL14	2.00	201.0	74.0	201.0	78.0
M16	NL16	2.00	307.0	100.0	306.0	106.0
M18	NL18	2.50	430.0	123.0	429.0	130.0
M20	NL20	2.50	602.0	156.0	600.0	165.0
M22	NL22	2.50	821.0	194.0	818.0	205.0
M24	NL24	3.00	1,036.0	225.0	1,034.0	238.0
M27	NL27	3.00	1,514.0	294.0	1,509.0	310.0
M30	NL30	3.50	2,064.0	358.0	2,058.0	378.0
M33	NL33	3.50	2,782.0	443.0	2,772.0	468.0
M36	NL36	4.00	3,589.0	522.0	3,576.0	551.0
M39	NL39	4.00	4,632.0	624.0	4,613.0	659.0
M42	NL42	4.50	5,731.0	716.0	5,709.0	757.0

Table legend

Cu/C paste - Nord-Lock steel washers, lubricated with copper/ graphite paste (Molykote® 1000).

Oil = WD40 has been used.
G_F = Ratio of yield point. When tightening according to guidelines and with no deviation, this is the pre-stress achieved expressed as % of yield point.

μ_{th} = thread friction coefficient
μ_h = under head friction coefficient
1 N = 0.225 lb
1 Nm = 0.738 ft-lb

Thread friction coefficients have theoretical values but are verified through testing. Under head friction coefficients have been established by tests.

The calculations are based on Kellerman & Klein formula.

Torque guidelines for other bolt grades are available through your local Nord-Lock representative.

Nord-Lock original steel washers with non-plated bolt grade 12.9

Bolt size	Washer size	Pitch [mm]	Oil, G_F=71% μ_{th}=0.15, μ_h=0.13		Cu/C paste, G_F=75% μ_{th}=0.13, μ_h=0.14	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
M3	NL3	0.50	2.2	3.9	2.3	4.1
M4	NL4	0.70	5.1	6.7	5.3	7.1
M5	NL5	0.80	10.0	10.9	10.3	11.5
M6	NL6	1.00	17.4	15.4	18.0	16.3
M8	NL8	1.25	42.0	28.0	43.0	30.0
M10	NL10	1.50	82.0	44.0	85.0	47.0
M12	NL12	1.75	142.0	65.0	146.0	68.0
M14	NL14	2.00	226.0	89.0	233.0	94.0
M16	NL16	2.00	345.0	120.0	355.0	127.0
M18	NL18	2.50	483.0	148.0	498.0	156.0
M20	NL20	2.50	676.0	188.0	696.0	198.0
M22	NL22	2.50	921.0	233.0	948.0	246.0
M24	NL24	3.00	1,165.0	270.0	1,199.0	286.0
M27	NL27	3.00	1,700.0	352.0	1,749.0	372.0
M30	NL30	3.50	2,316.0	430.0	2,386.0	454.0
M33	NL33	3.50	3,124.0	532.0	3,213.0	562.0
M36	NL36	4.00	4,029.0	626.0	4,145.0	662.0
M39	NL39	4.00	5,199.0	748.0	5,346.0	790.0
M42	NL42	4.50	6,434.0	860.0	6,617.0	908.0

Table legend

Cu/C paste - Nord-Lock steel washers, lubricated with copper/ graphite paste (Molykote® 1000).

Oil = WD40 has been used.
G_F = Ratio of yield point. When tightening according to guidelines and with no deviation, this is the pre-stress achieved expressed as % of yield point.

μ_{th} = thread friction coefficient
μ_h = under head friction coefficient
1 N = 0.225 lb
1 Nm = 0.738 ft-lb

Thread friction coefficients have theoretical values but are verified through testing. Under head friction coefficients have been established by tests.

The calculations are based on Kellerman & Klein formula.

Torque guidelines for other bolt grades are available through your local Nord-Lock representative.

Nord-Lock original stainless steel (ss) washers

Bolt size	Washer size	Pitch [mm]	A4-70 Cu/C paste, G_F=65%, μ_{th}=0.13, μ_h=0.13		A4-80 Cu/C paste, G_F=65%, μ_{th}=0.13, μ_h=0.13	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
M3	NL3ss	0.50	0.8	1.5	1.1	2.0
M4	NL4ss	0.70	1.8	2.6	2.4	3.4
M5	NL5ss	0.80	3.6	4.1	4.8	5.5
M6	NL6ss	1.00	6.3	5.9	8.4	7.8
M8	NL8ss	1.25	15.0	11.0	20.0	14.0
M10	NL10ss	1.50	30.0	17.0	39.0	23.0
M12	NL12ss	1.75	51.0	25.0	68.0	33.0
M14	NL14ss	2.00	81.0	34.0	108.0	45.0
M16	NL16ss	2.00	124.0	46.0	165.0	61.0
M18	NL18ss	2.50	173.0	56.0	231.0	75.0
M20	NL20ss	2.50	243.0	72.0	323.0	95.0
M22	NL22ss	2.50	330.0	89.0	440.0	118.0
M24	NL24ss	3.00	418.0	103.0	557.0	137.0
M27	NL27ss	3.00	609.0	134.0	812.0	179.0
M30	NL30ss	3.50	831.0	164.0	1,108.0	219.0
M36	NL36ss	4.00	1,444.0	239.0	1,925.0	319.0

Table legend

Cu/C paste - Nord-Lock stainless steel washers with stainless steel bolt, lubricated with copper/graphite paste (Molykote® 1000).

G_F = ratio of yield point. When tightening according to guidelines and with no deviation, this is the pre-stress achieved expressed as % of yield point.

μ_{th} = thread friction coefficient
μ_h = under head friction coefficient
1 N = 0.225 lb
1 Nm = 0.738 ft-lb

Thread friction coefficients have theoretical values but are verified through testing. Under head friction coefficients have been established by tests.

Torque guidelines for other bolt grades are available through your local Nord-Lock representative.

Nord-Lock original 254 SMO® washers

Bolt size	Washer size	Pitch [mm]	A4-70 Cu/C paste, G_F=65%, μ_{th}=0.13, μ_h=0.13		A4-80 Cu/C paste, G_F=65%, μ_{th}=0.13, μ_h=0.13	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
M3	NL3ss-254	0.50	0.8	1.5	1.1	2.0
M4	NL4ss-254	0.70	1.8	2.6	2.4	3.4
M5	NL5ss-254	0.80	3.6	4.1	4.8	5.5
M6	NL6ss-254	1.00	6.3	5.9	8.4	7.8
M8	NL8ss-254	1.25	15.0	11.0	20.0	14.0
M10	NL10ss-254	1.50	30.0	17.0	39.0	23.0
M12	NL12ss-254	1.75	51.0	25.0	68.0	33.0
M14	NL14ss-254	2.00	81.0	34.0	108.0	45.0
M16	NL16ss-254	2.00	124.0	46.0	165.0	61.0
M18	NL18ss-254	2.50	173.0	56.0	231.0	75.0
M20	NL20ss-254	2.50	243.0	72.0	323.0	95.0
M22	NL22ss-254	2.50	330.0	89.0	440.0	118.0
M24	NL24ss-254	3.00	418.0	103.0	557.0	137.0
M27	NL27ss-254	3.00	609.0	134.0	812.0	179.0
M30	NL30ss-254	3.50	831.0	164.0	1,108.0	219.0
M36	NL36ss-254	4.00	1,444.0	239.0	1,925.0	319.0

Table legend

Cu/C paste - Nord-Lock 254 SMO® washers with stainless steel bolt, lubricated with copper/graphite paste (Molykote® 1000).

G_F = ratio of yield point. When tightening according to guidelines and with no deviation, this is the pre-stress achieved expressed as % of yield point.

μ_{th} = thread friction coefficient
μ_h = under head friction coefficient
1 N = 0.225 lb
1 Nm = 0.738 ft-lb

Thread friction coefficients have theoretical values but are verified through testing. Under head friction coefficients have been established by tests.

Torque guidelines for other bolt grades are available through your local Nord-Lock representative.

- Fastener Dimension Guide

Gather fastener data while performing bolted joint calculations. Enter the size and length of a bolt and find all the dimensions that conform to ISO standards.

Use the app at
nord-lock.com/nord-lock/fastener-dimension-guide/

The Fastener Dimension Guide was developed by Nord-Lock Group in cooperation with the Swedish Standards Institute (SIS).

- Torquelator by Nord-Lock

Calculate the required preload and corresponding torque of Nord-Lock washers quickly, easily and accurately.

Use the app at
nord-lock.com/nord-lock/torquelator/

For help with more complex torque calculations, contact your nearest Nord-Lock representative.

Torque guidelines

2D/3D CAD models