

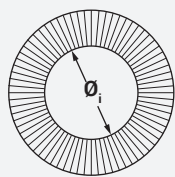


NORD-LOCK ORIGINAL STEEL WASHERS

DIMENSIONS

Delta Protekt® Zinc Flake Coating
Delta Seal GZ top coat

Through hardened EN 1.7182



NL3–NL8sp

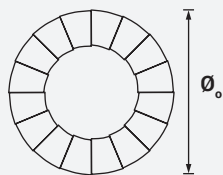
$\varnothing_i \pm 0.1 \text{ mm}$

NL3/8"–NL42

$\varnothing_i \pm 0.2 \text{ mm}$

NL45–NL130

$\varnothing_i +0.5 / -0.0 \text{ mm}$



NL3–NL1"sp

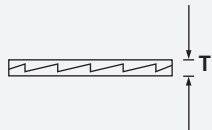
$\varnothing_o \pm 0.2 \text{ mm}$

NL27–NL42

$\varnothing_o \pm 0.3 \text{ mm}$

NL45–NL130

$\varnothing_o +0.0 / -2.0 \text{ mm}$



NL3–NL42

$T \pm 0.25 \text{ mm}$

NL45–NL130

$T \pm 0.75 \text{ mm}$

Note that washers with thickness 6.6 mm
have a thickness tolerance $+0.0 / -0.5 \text{ mm}$

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

Torque guidelines



2D/3D CAD models



- Torque guidelines web app:
www.nord-lock.com/nord-lock/torquelator
- 2D/3D CAD models:
www.nord-lock.com/nord-lock/cad

Bolt size		Product	Ø	Ø _i	Thickness T	Approx. weight	Min. Package
Metric	UNC	designation	[mm]	[mm]	[mm]	kg/100 pairs	[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

TORQUE GUIDELINES

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

Bolt size	Washer size	Pitch [mm]	Oil, $G_F=75\%$ $\mu_{th}=0.15, \mu_h=0.19$		Cu/C paste, $G_F=75\%$ $\mu_{th}=0.13, \mu_h=0.18$		Dry, $G_F=62\%$ $\mu_{th}=0.18, \mu_h=0.2$	
			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	1284.0	221.0	1183.0	221.0	1172.0	182.0
M30	NL30	3.50	1750.0	269.0	1613.0	269.0	1596.0	222.0
M33	NL33	3.50	2360.0	333.0	2173.0	333.0	2155.0	275.0
M36	NL36	4.00	3043.0	392.0	2803.0	392.0	2776.0	324.0
M39	NL39	4.00	3931.0	468.0	3619.0	468.0	3589.0	387.0
M42	NL42	4.50	4860.0	538.0	4476.0	538.0	4436.0	445.0

Cu/C paste - Nord-Lock steel washers with stainless steel bolt, 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 10.9

Bolt size	Washer size	Pitch [mm]	Oil, $G_F=71\%$ $\mu_{th}=0.15, \mu_h=0.15$		Cu/C paste, $G_F=75\%$ $\mu_{th}=0.13, \mu_h=0.15$	
			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	1036.0	225.0	1034.0	238.0
M27	NL27	3.00	1514.0	294.0	1509.0	310.0
M30	NL30	3.50	2064.0	358.0	2058.0	378.0
M33	NL33	3.50	2782.0	443.0	2772.0	468.0
M36	NL36	4.00	3589.0	522.0	3576.0	551.0
M39	NL39	4.00	4632.0	624.0	4613.0	659.0
M42	NL42	4.50	5731.0	716.0	5709.0	757.0

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

Bolt size	Washer size	Pitch [mm]	Oil, $G_F=71\%$ $\mu_{th}=0.15, \mu_h=0.13$		Cu/C paste, $G_F=75\%$ $\mu_{th}=0.13, \mu_h=0.14$	
			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	1165.0	270.0	1199.0	286.0
M27	NL27	3.00	1700.0	352.0	1749.0	372.0
M30	NL30	3.50	2316.0	430.0	2386.0	454.0
M33	NL33	3.50	3124.0	532.0	3213.0	562.0
M36	NL36	4.00	4029.0	626.0	4145.0	662.0
M39	NL39	4.00	5199.0	748.0	5346.0	790.0
M42	NL42	4.50	6434.0	860.0	6617.0	908.0