

Nord-Lock®

Steel Construction Washers

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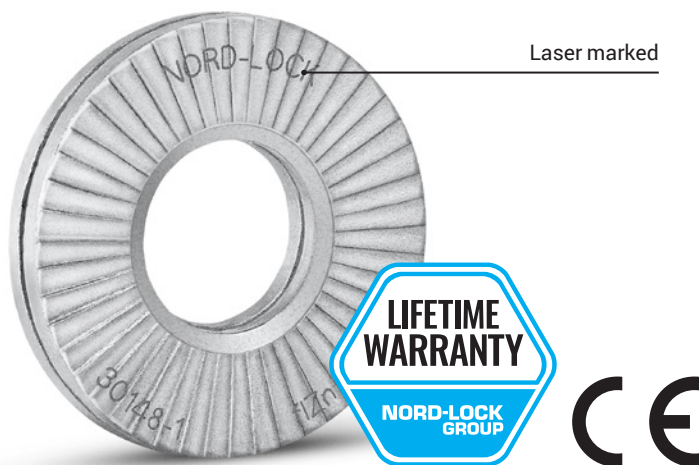


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NORD-LOCK®
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Prevents bolts from loosening



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.

Nord-Lock Steel Construction (SC) washers are wedge-locking washers specially designed for use on steel construction applications in accordance with the European standard EN 14399-3 / EN 14399-4 / EN 14399-8.

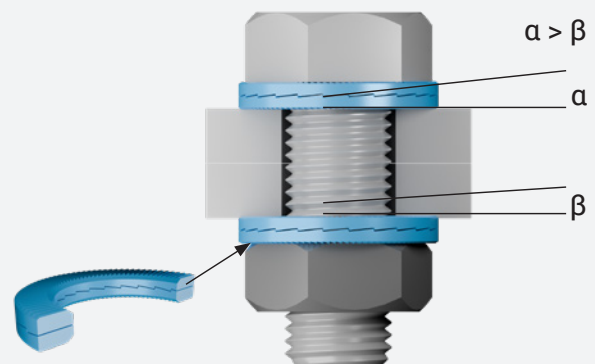
Applications

Nord-Lock SC-washers can easily replace a standard plain washer as well as chamfered washer to prevent the bolt from rotating loose. They are safe to use with high-strength structural bolting assemblies for preloading and are confirmed for HV-assemblies by the European Technical Assessment ETA-20/0010 issued by the German Institute for Construction Technology (DIBt).

SC-washers are safe to use in non-preloaded structural bolting assemblies according to EN 15048 and confirmed by the ETA-19/0813 issued by the DIBt.

How it works

Each washer pair has cam faces on one side and serrations on the other, with chamfers on the inner diameter to ensure optimal fit with HR and HV bolts. 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, maintaining preload and preventing loosening. The double-sided chamfers also eliminate the risk of incorrect installation.



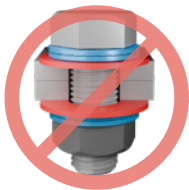
Joint Guide

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



Through holes

Through-holes require the use of two pairs of Nord-Lock SC-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 bolt secure whilst tightening the nut.



Design where Nord-Lock washers are not recommended

- With plain washers
- 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 extreme settlements
- When there is no clamping force in the joint



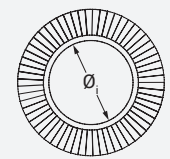
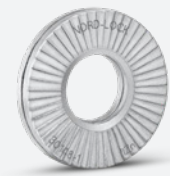
Product information

Applications	Building and constructions applications
Material standard	Steel EN 1.7182 or equivalent
Hardening	Through hardened*
Corrosion resistance	Minimum 1,000 hours in salt spray test (according to ISO 9227)
Temperature range	-40°C to 150°C**
Bolt grades	4.6 to 10.9
Product designation	NLSC
Laser marking	Traceable batch number and type code flZn
Size range	M12 – M36 (NL12SC – NL36SC)
Coating	Basecoat Delta Protekt® KL100, Topcoat VH 302 GZ

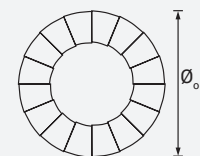
* Washer hardness must be greater than the hardness of the mating surfaces in order to assure its mechanical function.

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

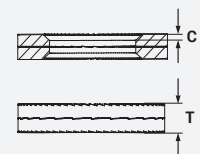
NORD-LOCK SC-WASHERS DIMENSIONS



NL12SC–NL16SC
 $\text{Ø}_i +0.17/-0.1 \text{ mm}$
 NL20SC–NL36SC
 $\text{Ø}_i \pm 0.2 \text{ mm}$



NL12SC–NL16SC
 $\text{Ø}_o +0.3/-0.2 \text{ mm}$
 NL20SC–NL24SC
 $\text{Ø}_o \pm 0.3 \text{ mm}$
 NL27SC
 $\text{Ø}_o \pm 0.5 \text{ mm}$
 NL30SC–NL36SC
 $\text{Ø}_o \pm 0.6 \text{ mm}$



NL12SC–NL30SC
 $T \pm 0.25 \text{ mm}$
 NL36SC
 $T \pm 0.6 \text{ mm}$

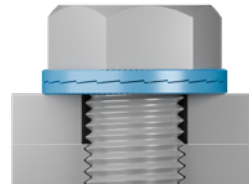
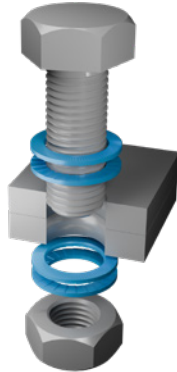
Bolt size Metric	UNC	Product designation	Ø_i [mm]	Ø_o [mm]	Thickness T [mm]	Chamfer C [mm]	Approx. weight kg/100 pairs	Min. Package [pairs]
M12		NL12SC	13.1	23.7	4.6	1.2	1.0	100
M16	5/8"	NL16SC	17.1	29.7	4.6	1.2	1.5	100
M20		NL20SC	21.4	36.7	4.6	1.5	2.3	100
M22	7/8"	NL22SC	23.4	38.7	4.6	1.5	2.5	50
M24		NL24SC	25.3	43.7	4.6	1.5	3.2	50
M27		NL27SC	28.4	49.5	5.8	1.8	5.6	25
M30	1 1/8"	NL30SC	31.4	55.4	5.8	1.8	6.9	25
M36	1 3/8"	NL36SC	37.4	65.4	6.0	1.6	11.0	25

Material standard	Hardening	Coating	Corrosion resistance	Temperature range
Steel EN 1.7182	Through hardened	Delta Protekt® KL100 zinc flake coating	Minimum 1,000 hours in salt spray test (according to ISO 9227)	-40°C to 150°C

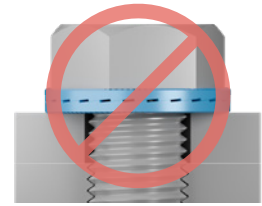
Assembly Instructions

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.



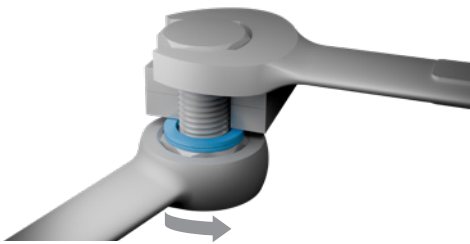
Closed cams - correct



Open cams – not correct

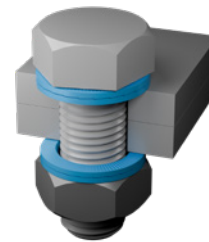
2.

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

Nord-Lock SC-washers

Bolt size	Washer size	Torque method ¹			Combined method ¹		Securing Torque ² $M_{T,SC,sec}$ [Nm]
		Tightening torque $M_{TM,SC}$ [Nm]	Preloading force ³ without retightening $F_{p,C,red*}$ [kN] (90%)	Preloading force $F_{p,C*}$ [kN]	Pretightening torque $M_{CM,SC}$ [Nm]	Preloading force $F_{p,C}$ [kN]	
M12	NL12SC	165	45	50	120	59	80
M16	NL16SC	400	90	100	290	110	200
M20	NL20SC	800	144	160	510	172	360
M22	NL22SC	1.100	171	190	720	212	520
M24	NL24SC	1.300	198	220	880	247	640
M27	NL27SC	1.900	261	290	1300	321	1000
M30	NL30SC	2.300	315	350	1700	393	1320
M36	NL36SC	4.050	459	510	2700	572	2240

Table legend

All given values are only valid for bolting assemblies of property class 10.9 that originally correspond to k-class K1 (usually System HV according to EN 14399-4 /-8)

¹According to EN 1090-2

²Minimum tightening torque to achieve a securing effect.

³Differentiation between $F_{p,C,red*}$ and $F_{p,C*}$ is only relevant for bolting categories B and C acc. to EN 1993-1-8

Additional rotation for the second step in the combined method¹

Total nominal thickness "t" of parts to be connected (including all packs and washers)
d = bolt diameter

Further rotation to be applied, during the second step of tightening

	Degrees	Part turn
t > 2d	60	1/6
2d ≤ t < 6d	90	1/4
6d ≤ t ≤ 10d	120	1/3
10d < t	No recommendations	

Table legend

Tightening angles when using the combined method varies depending on the clamp length, (t), in relation to bolt diameter, (d).