

Nord-Lock X-Series Washers

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Material Guide

Material standard	Hardening	Coating	Corrosion resistance	Temperature range
Steel EN 1.7225	Through hardened	Base coat: Delta Protekt® KL100 zinc flake coating Top coat: VH 302 GZ	Minimum 1,000 hours in salt spray test (according to ISO 9227)	-40°C to 150°C

Torque Guidelines

The below torque values have been verified in test laboratories and represent a configuration example. The values are indicative and should not be seen as recommendations as varying conditions, joint designs and requirements apply. The Nord-Lock Group provides customized torque calculations to any standard, free of charge.

Nord-lock X-series 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]
M6	NLX6	1.00	13	9.7	12	9.7	12	8
M8	NLX8	1.25	32	18.0	29	18.0	29	15
M10	NLX10	1.50	62	28.0	57	28.0	56	23
M12	NLX12	1.75	107	40.0	99	40.0	97	33
M14	NLX14	2.00	170	55.0	157	55.0	155	46
M16	NLX16	2.00	260	75.0	240	75.0	237	62
M20	NLX20	2.50	510	118.0	470	118.0	464	97

Cu/C paste = copper/graphite paste
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.

Nord-Lock X-series steel washers with non-plated bolt grade 10.9

Bolt size	Washer size	Pitch [mm]	Oil, $G_f=71\%$ $\mu_{th}=0.15, \mu_h=0.13$		Cu/C paste, $G_f=75\%$ $\mu_{th}=0.13, \mu_h=0.14$	
			Torque [Nm]	Clamp load [kN]	Torque [Nm]	Clamp load [kN]
M6	NLX6	1.00	15.5	12.9	15.5	13.6
M8	NLX8	1.25	37.0	23.0	37.0	25.0
M10	NLX10	1.50	73.0	37.0	73.0	39.0
M12	NLX12	1.75	126.0	54.0	126.0	57.0
M14	NLX14	2.00	201.0	74.0	201.0	78.0
M16	NLX16	2.00	307.0	100.0	306.0	106.0
M20	NLX20	2.50	602.0	156.0	600.0	165.0

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

One solution for multiple design challenges

Utilizing a unique multifunctional design, Nord-Lock X-series washers secure bolted joints against both spontaneous bolt loosening and slackening. A hot melt adhesive is used to assemble the washers in pairs. The ingredients of the adhesive meet the compositional requirements of the American Food & Drug Administration regulations 21 CFR 175.105 "Adhesives".



Joint Guide

Use this guide to help you use Nord-Lock X-series washers correctly. If you have an application that does not meet our design criteria, contact us and we will help you find a solution. Store dry the washer boxes at -15°C to 25°C (5°F to 77°F).



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 one pair for securing the nut.



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.



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.



- 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
- With non-preloaded joints

Assembly Instructions

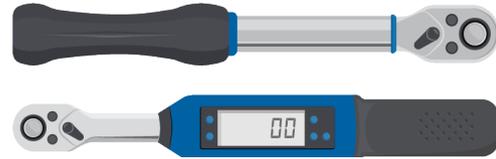
Tightening of threaded holes



1.

Put on the pre-assembled washer pair on the bolt and install the bolt in the threaded hole.

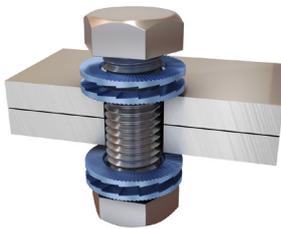
We recommend the use of a lubricant. Lubricate the thread and the area under the head prior to installation.



2.

Tighten the bolt at a torque according to the Nord-Lock torque guidelines, using a calibrated torque wrench.

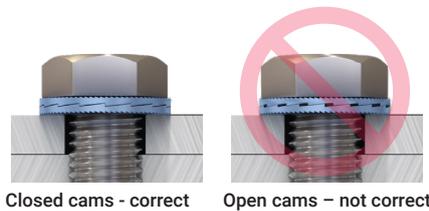
Tightening of through holes



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.

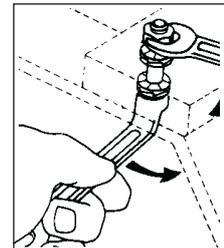


Closed cams - correct

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.

How it works

Nord-Lock X-series washers combine Nord-Lock wedge-locking technology with a spring effect. The wedge effect prevents bolt loosening caused by vibration and dynamic loads. The spring effect (F_s) counteracts the slackening movement of the bolt, preventing loss of preload in the joint.

