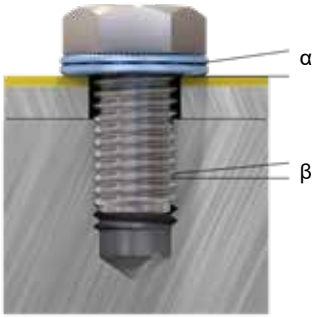
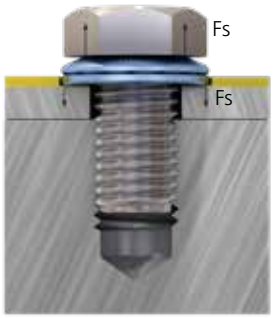
A multifunctional solution



A pair of Nord-Lock X-series washers has cams on one side and radial teeth on the opposite side to secure the bolted joint with tension instead of friction. The conical shape creates an elastic reserve in the bolted joint to compensate for the loss of preload and prevent slackening.





Since the cam angle (α) is greater than the thread pitch (β), the wedge-locking effect will prevent any rotation of the fastener. The spring effect (Fs) counteracts the slackening movement of the bolt, preventing loss of preload in the joint.

- Prevents bolt loosening caused by vibration and dynamic loads
- Compensates for loss of preload due to settlement and relaxation
- One solution to cover multiple design challenges
- Accurate preload with defined and uniform friction
- Reusable and reduces number of parts in stock
- Quick and easy assembly / disassembly
- Increases operational reliability while reducing the risk of unplanned production stops, accidents, and warranty claims

X-series joint guide



Tapped holes



Through holes



Counter bores



Stud bolts - No need for adhesives



Applications with large or slotted holes



Mating surfaces must be locked in place

Nord-Lock X-series washers are certified by TÜV. More information:
www.nord-lock.com/certificates

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English • Printed in Sweden • 2017-01 • 70203EN

NORD-LOCK X-SERIES

Expand your design possibilities



Nord-Lock X-series

NORD-LOCK®

MORE DESIGN POSSIBILITIES FOR THE WORLD!

There are two main reasons why bolted joints fail - **Spontaneous bolt loosening** due to vibration / dynamic loads or **Slackening** due to settlement and / or relaxation.

Design trends and new requirements such as fuel saving, lighter parts and increased capacity call for new capabilities. Joints increasingly need to be able to withstand combinations of challenges.

The X-series washer is the world's most modern wedge-locking solution, allowing you to expand your design possibilities.

Challenging conditions



Vibration and dynamic loads

The wedge-locking technology in Nord-Lock X-series washers has been proven as the most secure solution to prevent spontaneous bolt loosening in bolted joints for 30 years.



Thermal cycling

Most materials expand when subjected to higher temperatures. Therefore, critical designs involving cycling between hot and cool temperatures will have significant joint slackening as gaskets, bolts, and other parts expand and contract over time. The spring effect in Nord-Lock X-series washers offers an effective means to compensate for this cycling to maintain an even load.

Challenging materials



Painted or powder coated surfaces

Surface treatments are common for applications that need to be protected from corrosion. Treating or painting a surface with a thick layer before installing a bolt can lead to slackening as the bolt sinks into the treated surface after tightening. Even a thin layer of paint can put joints at risk. The compensating spring effect in Nord-Lock X-series washers is an invaluable added benefit.



Soft metals

Many industries make use of soft metals such as copper and aluminum to achieve conductivity, sacrificial corrosive properties, and other benefits. These applications are often also subjected to significant vibration, dynamic loads and even slight movement (as is the case with cable shoes). The multiple benefits of Nord-Lock X-series washers offer an ideal solution for total bolt security.



Composites or polymers

Advances in polymers and sandwich composite technology — with its impressive strength-to-weight ratio and corrosion-resistant properties — allow industries to make applications lighter without losing strength. These materials are softer than the metal materials previously used and this makes slackening an additional challenge to add to the existing factors of vibration and dynamic loads. The Nord-Lock multifunctional wedge-locking concept is ideally suited to secure these new technologies.

Challenging designs



Multiple clamped parts or short clamp length

The more parts you clamp together, the more you compound any slackening effect in the bolted joint. Settlement and relaxation are multiplied by each contact surface, as well as other elements such as surface treatments, thermal cycling, and vibration. The combined tension and spring actions in Nord-Lock X-series washers effectively handle all these factors.



Gasketed joints

Many gaskets suffer from continued relaxation after initial tightening. Factors such as thermal cycling, soft metals, and vibration compound the effect. The resulting loss of clamp load can lead to leaks or even blowouts — a potentially devastating outcome. Nord-Lock X-series washers not only compensate for unavoidable relaxation in gaskets, but also handle the other factors acting on the joint, including vibration.

X-series washers can also be used where other challenging conditions exist e.g. where the contact face is at a slight angle to the axis of the bolt. Please ask your Nord-Lock representative for support when considering such applications.

WANT TO LEARN MORE?

Ask your Nord-Lock representative for case stories and details on how X-series can secure your challenging joints.

Find your local Nord-Lock representative and contact us today to arrange a visit: **www.nord-lock.com/contact**