



# NORD-LOCK®

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**Original wedge-locking solutions - when failure is not an option**



# NORD-LOCK®

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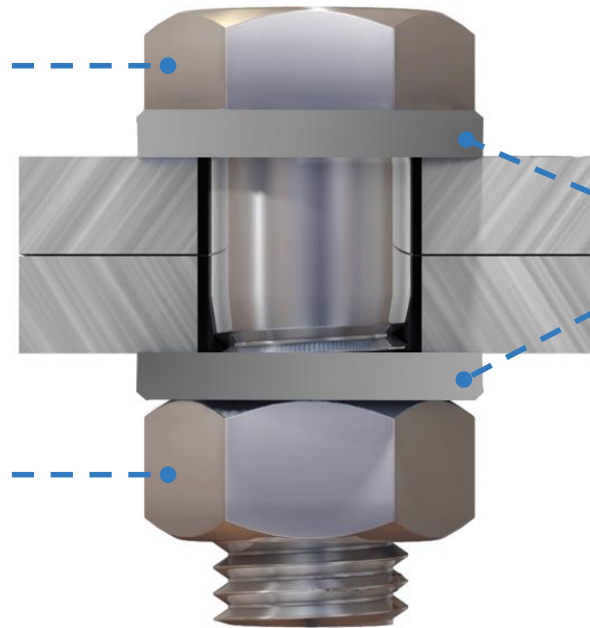
**SC-washers for steel  
construction applications**

# HV/HR set components

A HV/HR set consists of one bolt, two plain washers with special chamfering and one lubricated nut.

HV/HR bolts  
*According to  
DIN EN 14399-4 /  
DIN EN 14399-3*

HV/HR nuts  
*According to  
DIN EN 14399-4 /  
DIN EN 14399-3*

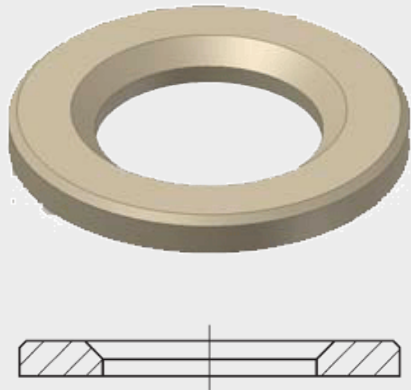


HV/HR washers  
*According to  
DIN EN 14399-6*



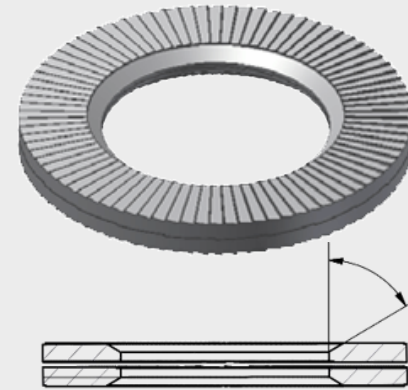
# SC-washers

The standard washers (EN 14399-6 chamfered plain washers) used with HV/HR sets can now be replaced by Nord-Lock SC-washers based on the leading Nord-Lock wedge-locking principle.



## Standard HV washers

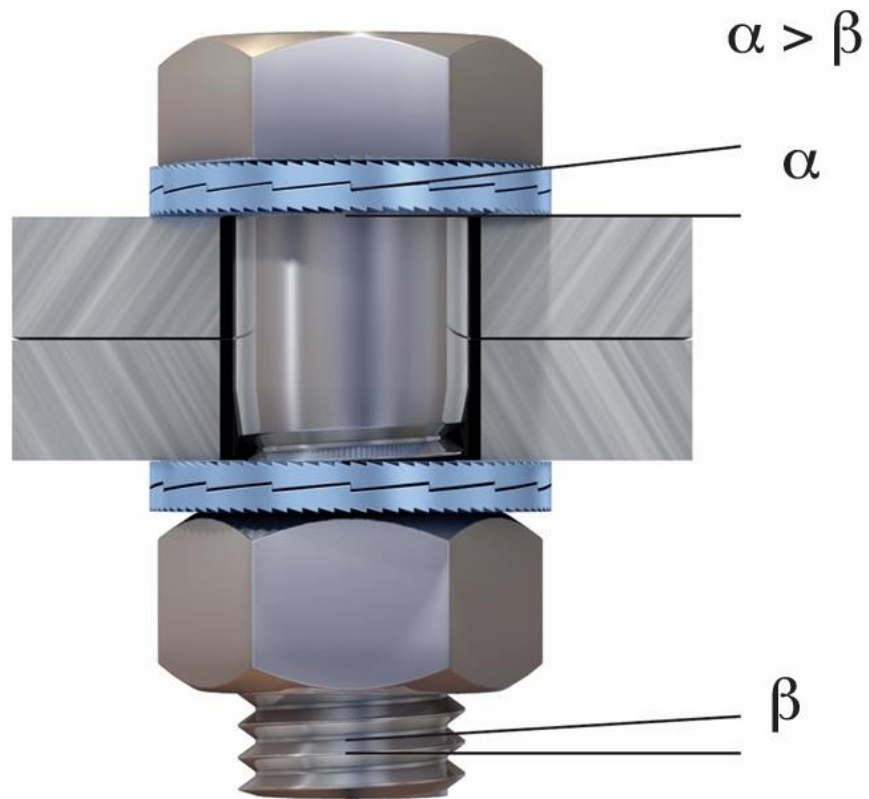
Standard HV/HR- washers are washers with a larger chamfer on the inner diameter and a smaller chamfer on the outer diameter. The chamfer is only on one side and the installer must orient the washer correctly during installation.



## Nord-Lock SC-washers

Based on the Nord-Lock wedge-locking technology, they have been designed with a chamfer on the inner diameter of each washer pair to ensure an optimal contact surface between the HV/HR-bolt and the washer. Since the chamfer is present on both sides failures related to wrong assembly can be eliminated.





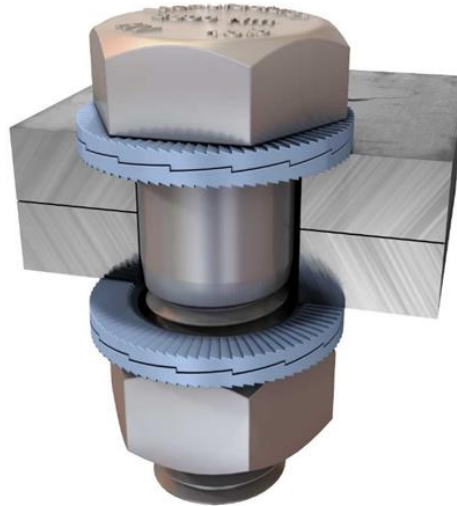
## The principle

- The key is the difference in angles. Since the cam angle , $\alpha$ ' is larger than the thread pitch , $\beta$ ' a wedge effect is created by the cams, preventing the bolt from rotating loose.

This wedge locking principle positively lock the fastener in a joint which is subjected to extreme vibration or dynamic loads.

# Joint Guide

- Through holes require the use of two pairs of washers.
- Washers must be placed on mating surfaces that are locked in place.

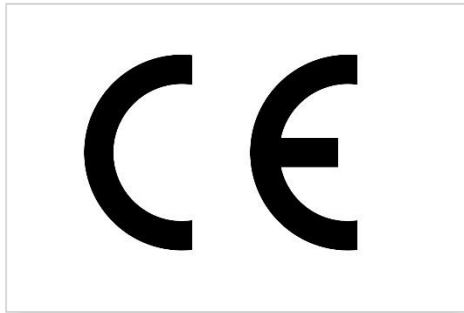


**Through holes**



**Not recommended**

# Certificates & Approvals



Nord-Lock SC-washers are CE-marked for use with HV sets.



- ❖ National Technical Approval (Z-14.4-629)
- ❖ European Technical Approval (ETA-13/0246)



Certified by TÜV



# Advantages

- Prevents loosening caused by vibration and dynamic loads
- Quick to install and removable with standard tools
- Easy and safe installation on HV / HR bolts due to double sided chamfer
- Locking function not affected by lubrication
- Defined and uniform friction condition which result in less deviation of achieved preload
- Same temperature characteristics as standard bolt / nut
- Reliable locking, even for joints with short clamp length
- Reusable
- High corrosion resistance



# Applications

- Steel structures
- Steel-framed building constructions
- Special steel constructions
- Steel bridges
- Conveyor technology
- Power plant constructions
- Airport constructions
- Temporary structures
- Cranes
- Crane tracks



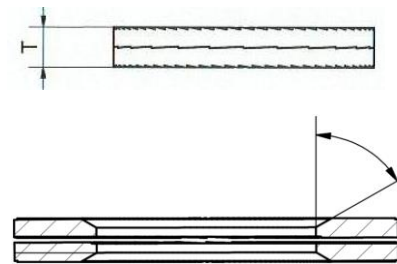
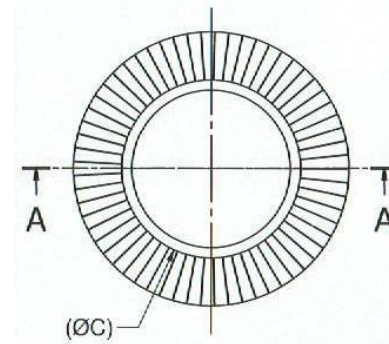
# Technical data

## Material information

<b>Material</b>	Steel 1.7182 or equivalent
<b>Hardness</b>	HV1 > 465 HV through hardened
<b>Surface coating</b>	Zinc flake coated free of cadmium + chrome VI

## Dimension chart

Washer size	Bolt size	$\phi_1$ [mm]	$\phi_0$ [mm]	Thickness T [mm]	Chamfer H [mm]
NL12SC	M12	13,1	23,7	4,6	1,2
NL16SC	M16	17,1	29,7	4,6	1,2
NL20SC	M20	21,4	36,7	4,6	1,6
NL22SC	M22	23,4	38,7	4,6	1,6
NL24SC	M24	25,3	43,7	4,6	1,6
NL 27SC	M27	28,4	49,5	5,8	1,8
NL 30SC	M30	31,4	55,4	5,8	1,8
NL 36SC	M36	37,4	65,4	6,0	1,6



# Technical data

## Torque guidelines

Washer size	Reduced preload force	Modified torque method	Modified combined method* [torque + angle]
	$F_{P, C, NL}$	torque moment $M_{A, NL}$	pre-torque moment $M_{A, MKV, NL}$
	[kN]	[Nm]	[Nm]
NL12SC	45	130	100
NL16SC	90	330	250
NL20SC	145	660	490
NL22SC	170	850	640
NL24SC	200	1100	825
NL27SC	260	1600	1220
NL30SC	315	2150	1650
NL36SC	460	3750	2800

\* Torque conditions are specified in the ETA-13/0246.

## Tightening angles\*

$t < 2d$	45°	1/8
$2d \leq t < 6d$	60°	1/6
$6d \leq t \leq 10d$	90°	¼
$10d < t$	No recommendations	

*\*Tightening angles are specified in the  
ETA-13/0246*

Application: Bridge over cooling water

Country: Netherlands

Product: NL SC-washers



Nord-Lock SC-washers



### Problem:

**Janson Bridging Group built temporary bridges for rail and road traffic at the Yangtzehaven. Bolted joints of the standard steel bridge are fastened with bolts and nuts subjected to eventual bolt loosening due to continuous vibration.**

### Solution:

**Nord-Lock SC-washers secure the bolted joints of the bridges. Janson Bridging tightens the longitude and transverse beams of their bridge systems through a bolted joint which is partly used as a preloaded bolted joint. The preloaded bolted joints are tightened with calibrated torque tools.**





Application: Set of special gates

Country: Panama

Product: NL SC-washers

Dimension: NL20SC, NL24SC, NL27SC



Nord-Lock SC-washers



### Problem:

**Cimolai Technology** started using Nord-Lock washers in the new sets of gates and in the infrastructure for the Panama Canal expansion project. They needed Nord-Lock washers for a very specific steel construction application using HR bolt sets.

### Solution:

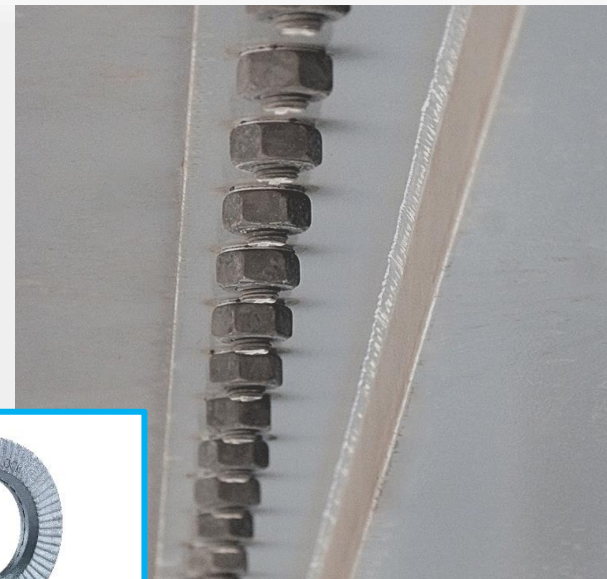
After a technical meeting with to analyze the existing potential solution of NLSC-washers for a specific application and several tests performed to determine the torque for each batch number of HR-bolts being used, they found that Nord-Lock SC-washers was the perfect solution to their specific application.

Application: Crane girder

Country: Germany

Product: NL SC-washers

Dimension: NL16SC, NL20SC, NL24SC



Nord-Lock SC-washers

Application: Railway bridge

Country: Algeria

Product: NL SC-washers

Dimension: NL12SC, NL16SC, NL20SC, NL27SC



Nord-Lock SC-washers



Application: Severins bridge

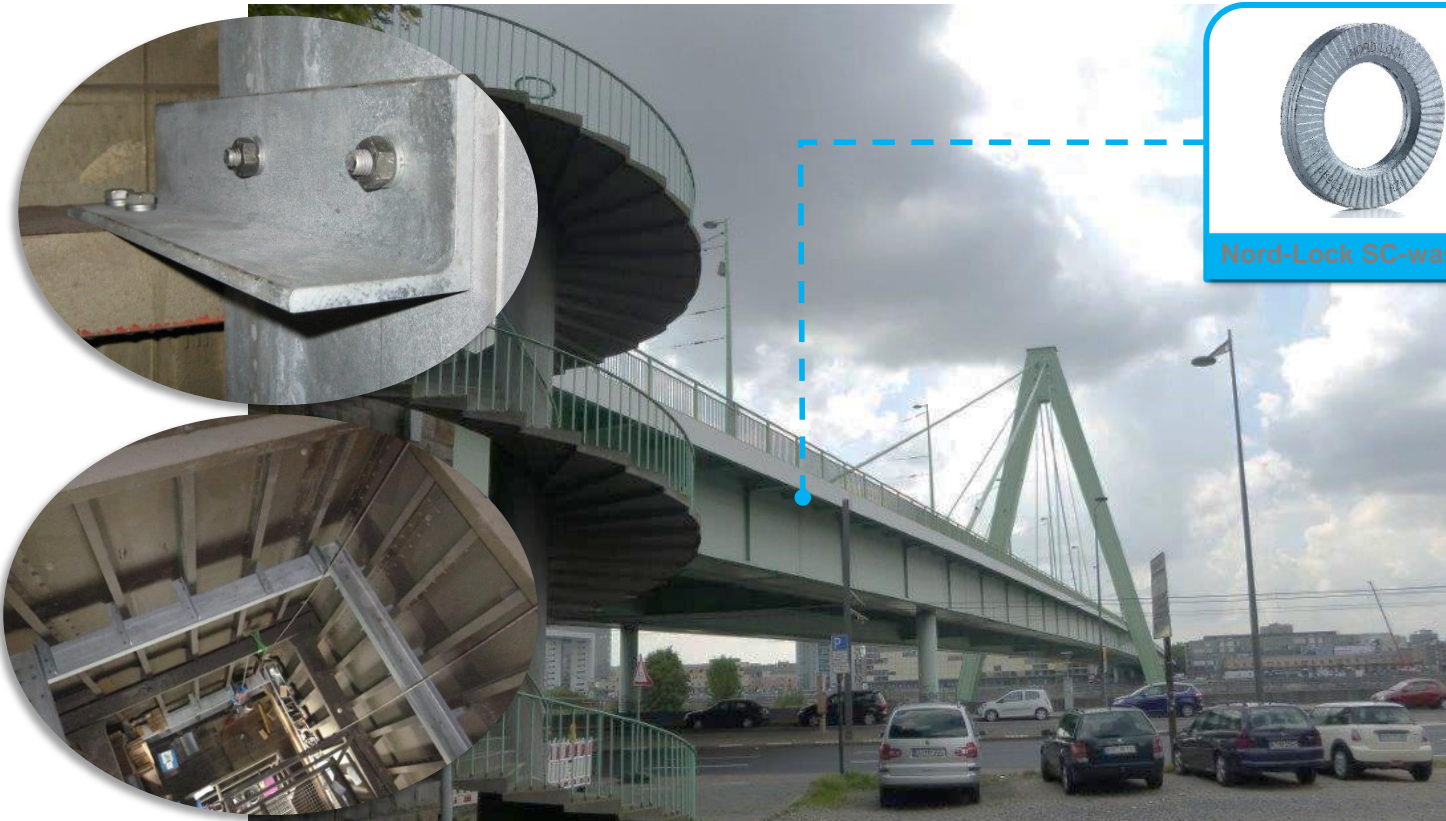
Country: Germany

Product: NL SC-washers

Dimension: NL12SC, NL16SC



Stadt Köln



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**Thank you!**

