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European Technical Assessment

ETA-20/0010
of 21 February 2025

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General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Nord-Lock SC-washers for high-strength structural bolting
assemblies for preloading

Product family
to which the construction product belongs

Locking washers preventing self-loosening of bolting
assemblies

Manufacturer

Nord-Lock AB
Halabacken 180
83791 MATTMAR
SCHWEDEN

Manufacturing plant

Plant 1
Plant 2

This European Technical Assessment
contains

9 pages including 5 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

EAD 331565-00-0602

This version replaces

ETA-20/0010 issued on 16 January 2020

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Specific part

1 Technical description of the product

Nord-Lock SC-washers are self-locking securing washers for high strength structural bolting assemblies for preloading which are subject to static, quasi-static, fatigue-relevant (dynamic) or shock loads.

The Nord-Lock SC-washers consist in each case of two same washers with serrations on one side and cams on the other side. The individual washers are mounted in pairs with the cam surfaces facing each other, with one pair of washers being placed between the bolt head and the structural parts and a second pair of washers between the nut and the structural parts. As the connection is tightened, the serrations of the washers are imprinted into the mating surfaces, resulting in positive fit. As a result, only the individual washers can rotate against each other during self-loosening. This is counteracted by the pitch of the cams, which is always greater than the thread pitch.

In order to guarantee the securing effect of the Nord-Lock SC-washers, the hardness of the structural parts shall not be higher than the hardness of the Nord-Lock SC-washers (465 HV). Examples of Nord-Lock SC-washers and a connection made with them can be found in Annex A 1.

2 Specification of the intended use in accordance with the applicable European Assessment Document 331565-00-0602 Wedge lock washer for high-strength structural bolting assemblies for preloading under dynamic loads or vibrations

The Nord-Lock SC-washers replace the otherwise used flat washers according to EN 14399-5:2014-04 or EN 14399-6:2015-04 in high strength structural bolting assemblies M12 to M36 for preloading EN 14399-3:2015-04, EN 14399-4:2015-04 or EN 14399-8:2019-06.

Their dedicated use is for bolting categories A to E according EN 1993-1-8:2010-12.

The securing and/or preloading effect is only guaranteed if requirements for execution according to Annex C 1 to C 3 are respected.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the Nord-Lock SC-washers of at least 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Geometry	see annex B 1
Hardness of washers	see annex A 1
Preloading	see annex C 1 to C 3
Securing effect	see annex C 1 to C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.3 Durability

Essential characteristic	Performance
Corrosion resistance	see annex A 1

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD No. 331565-00-0602, the applicable European legal act is: 1998/214/EC.
The system to be applied is: 2+

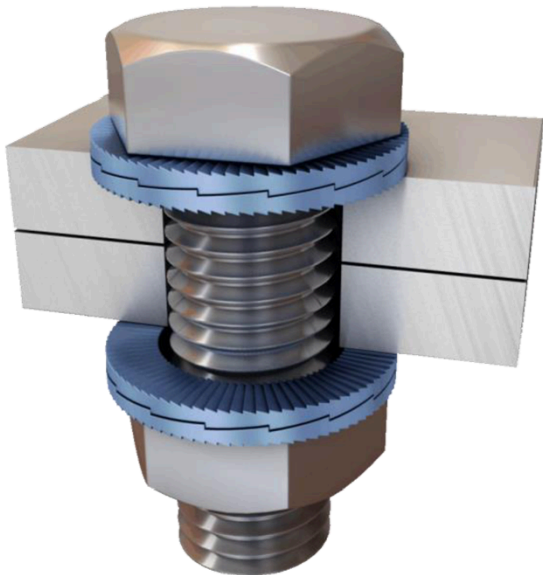
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with Deutsches Institut für Bautechnik.

Issued in Berlin on 21 February 2025 by Deutsches Institut für Bautechnik

Dr.-Ing. Schwuchow
Head of Section

beglaubigt:
Hahn



Schematic illustration of a bolted connection with two Nord-Lock SC-washers

Table A1 Series, available nominal diameter, material, hardness

Series	Nominal diameter	Material	Material number	Hardness
NLSC	M12 to M36	Low alloyed steel	1.7182	470 – 610 HV1

Corrosion protection

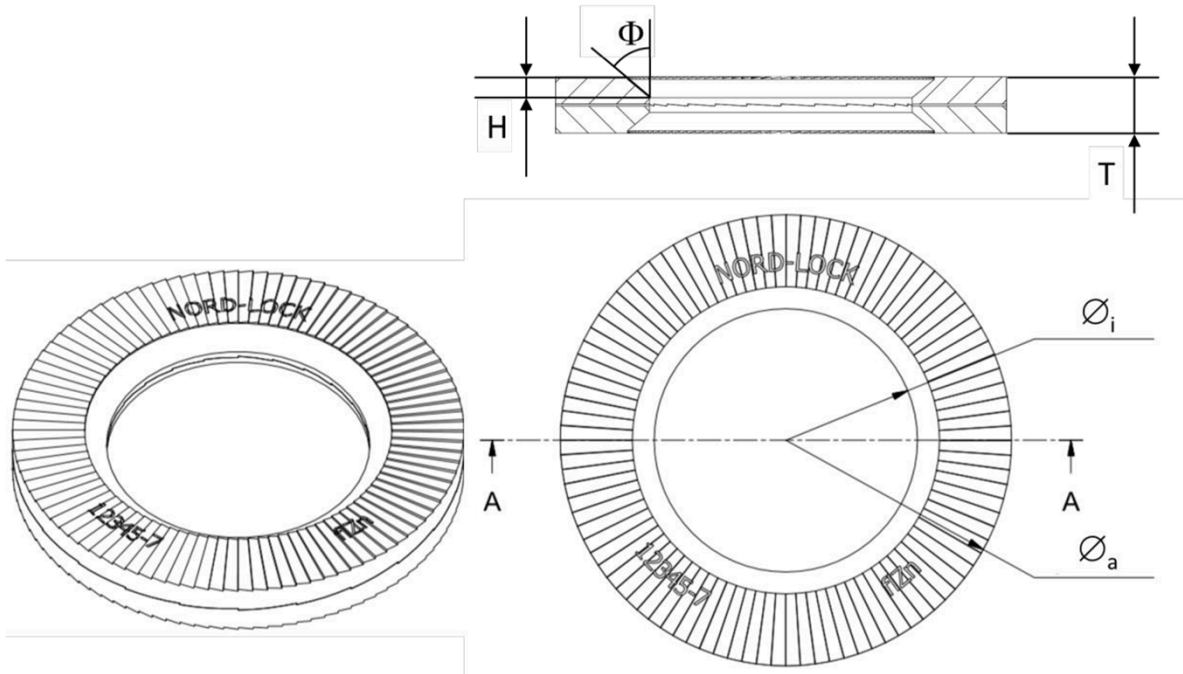
Nord-Lock SC washers are supplied with a zinc flake coating with a dry layer thickness of approx. 8 µm and an inorganic top coating of approx. 2 µm.

The corrosion protection duration in the neutral salt spray test in accordance with ISO 9227:2023-03 is at least 1.000 hours.

Nord-Lock SC-washers for high strength structural bolting assemblies for preloading	Annex A 1
Schematic illustration of a bolted connection with two Nord-Lock SC-washers, available nominal diameter, material, hardness and corrosion protection of Nord-Lock SC washers	

Tabelle B1 Main dimensions of Nord-Lock SC-washers

NLSC	Nominal diameter	Ø _i [mm]	Ø _a [mm]	T [mm]	H [mm]	Φ [°]	Serration count	Cam count
NL12SC	M12	13,1	23,7	4,6	1,2	50	47	20
NL16SC	M16	17,1	29,7	4,6	1,2	50	61	24
NL20SC	M20	21,4	36,7	4,6	1,6	50	96	24
NL22SC	M22	23,4	38,7	4,6	1,6	50	120	24
NL24SC	M24	25,3	43,7	4,6	1,6	50	120	24
NL27SC	M27	28,4	49,5	5,8	1,8	52,5	120	28
NL30SC	M30	31,4	55,4	5,8	1,8	52,5	120	28
NL36SC	M36	37,4	65,4	6,0	1,6	60	140	28



Nord-Lock SC-washers for high strength structural bolting assemblies for preloading	Annex B 1
Main dimension of Nord-Lock SC-washers	

Nord-Lock SC-washer replace the otherwise used flat washers according to EN 14399-5:2015-04 or EN 14399-6:2015-04 in high strength structural bolting assemblies for preloading according to EN 14399-3:2015-04, EN 14399-4:2015-04 or EN 14399-8:2019-06.

The required clamp length of the bolting assembly can be increased in accordance with Table C1. Otherwise, the specific Nord-Lock SC-washer thicknesses according to Table B1 must be considered.

Table C1 Increase of the required clamp length when using Nord-Lock SC-washers instead of flat washers according to EN 14399-5 or -6

Nominal diameter	M12	M16	M20	M22	M24	M27	M30	M36
Clamp length $\Sigma t +$	3,0 mm	1,0 mm	1,0 mm	1,0 mm	1,0 mm	1,5 mm	1,5 mm	0,0 mm

For bolting assemblies of property class 10.9, which originally corresponded to k-class K1 according to EN 14399-1:2015-04, section 4.5 with flat washer instead of Nord-Lock SC-washer (usually system HV), the tightening torques and preload forces according to Table C2a and C2b apply. The preload forces $F_{p,C}^*$ specified in Table C2a for the torque-controlled method require the bolted connection to be retightened with $M_{TM,SC}$ within a period of 3 to 7 days, otherwise the design must be carried out with $F_{p,C,red}^*$. If the preload forces are not considered for the design, the tightening torques specified in Table C3 may be applied to achieve a securing effect. Deviating from the tightening torques specified in Table C3, lower tightening torques can also be used, provided that a procedural instruction based on EAD 331565-00-06027 is available for the respective individual case to check the securing effect.

For bolting assemblies of property class 8.8 or 10.9 that correspond to k-class K2 according to EN 14399-1:2015-04, section 4.5 (usually system HR), the supplier of the bolting assembly with Nord-Lock SC-washers must fulfil the suitability characteristics for preloading of the bolting assembly in accordance with EN 14399-3:2015-04, EN 14399-4:2015-04 or EN 14399-8:2019-06 and indicate the corresponding k-value.

The total layer thickness of metallic coatings and / or organic coatings shall not exceed 300 μm in the area of the Nord-Lock SC-washers.

The components to be connected must lie directly on top of each other. Any gaps between the components must be closed after the bolts have been tightened. The bolt axis must be at right angles to the component surface. Any inclinations must be compensated for using suitable taper washers.

One Nord-Lock SC-washer must always be placed on the bolt head side and one on the nut side. A combination with other washers, except for non-rotating taper washers, is not permitted.

Note that each Nord-Lock SC-washer consists of two individual washers glued together. Nord-Lock SC-washers where this glue has already come loose before assembly shall no longer be used due to possible incorrect assembly.

Nord-Lock SC-washer may be reused if a procedural instruction based on EAD 331565-00-0602 is available for the respective individual case. When using the combined method, the reuse of any fasteners (bolts, nuts and washers) is forbidden.

Nord-Lock SC-washers according to this assessment have been assessed in accordance with the regulations of EAD 331565-00-0602 section 2.2.3 on the securing effect and are maintenance-free.

Nord-Lock SC-washers for high strength structural bolting assemblies for preloading

Execution instructions for bolting assemblies with Nord-Lock SC-washers

Annex C 1

Table C2a Tightening torques to achieve the preloading force for bolting assemblies that originally corresponded to k-class K1 (usually System HV according to EN 14399-4 or EN 14399-8)

Designation	Nominal diameter	Torque method		
		Tightening torque	Preloading force ¹⁾ without retightening	Preloading force
		$M_{TM,SC}$ [Nm]	$F_{p,C,red}^*$ [kN] (90 %)	$F_{p,C}^*$ [kN]
NL12SC	M12	165	45	50
NL16SC	M16	400	90	100
NL20SC	M20	800	144	160
NL22SC	M22	1.100	171	190
NL24SC	M24	1.300	198	220
NL27SC	M27	1.900	261	290
NL30SC	M30	2.300	315	350
NL36SC	M36	4.050	459	510

¹⁾ Differentiation between $F_{p,C,red}^*$ and $F_{p,C}^*$ is only relevant for bolted categories B and C

Table C2b Pre-tightening torque for the combined method to achieve the preloading force for bolting assemblies that originally corresponded to k-class K1 (usually System HV according to EN 14399-4 or EN 14399-8)

Designation	Nominal diameter	Combined method ²⁾	
		Pre-tightening torque	Preloading force
		$M_{CM,SC}$ [Nm]	$F_{p,C}$ [kN]
NL12SC	M12	165	50
NL16SC	M16	400	100
NL20SC	M20	800	160
NL22SC	M22	1.100	190
NL24SC	M24	1.300	220
NL27SC	M27	1.900	290
NL30SC	M30	2.300	350
NL36SC	M36	4.050	510

²⁾ For additional rotation angles § EN 1090-2 Table 21 applies

Nord-Lock SC-washers for high strength structural bolting assemblies for preloading

Execution instructions for bolting assemblies with Nord-Lock SC-washers

Annex C 2

Tabelle C3 Tightening torques to achieve a securing effect for bolting assemblies that originally corresponded to k-class K1 (usually System HV according to EN 14399-4 or EN 14399-8)

Designation	Nominal diameter	Torque method
		Tightening torque $M_{T,SC,sec}$ [Nm]
NL12SC	M12	80
NL16SC	M16	200
NL20SC	M20	360
NL22SC	M22	520
NL24SC	M24	640
NL27SC	M27	1.000
NL30SC	M30	1.320
NL36SC	M36	2.240

Nord-Lock SC-washers for high strength structural bolting assemblies for preloading

Execution instructions for bolting assemblies with Nord-Lock SC-washers

Annex C 3