

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

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European Technical Assessment

ETA-19/0813
of 9 October 2020

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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 NL wedge lock washer for non- preloaded
bolting assemblies

Product family
to which the construction product belongs

Locking washers preventing self-loosening of bolting
assemblies

Manufacturer

Nord-Lock AB
Halabacken 180
83702 MATTMAR
SCHWEDEN

Manufacturing plant

Plant 1
Plant 2

This European Technical Assessment
contains

11 pages including 7 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

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Specific part

1 Technical description of the product

Nord-Lock washers are self-locking securing washers for non-preloaded structural bolting assemblies according to EN 15048-1:2016 Nord-Lock washer are used in place of regular washer in bolted assemblies. The application is allowed for bolted connections with bolts and nuts (assemblies) as well as underneath nuts – e.g. on threaded rods – and under bolt heads for screw-in connections.

Nord-Lock washers also effectively secure these connections against loosening with dynamic load, impact load or considerable vibration load.

Nord-Lock washers consist in each case of two same washers with radial teeth on one side and cam faces on the other side. The pre-assembled washers are installed in pairs, cam face to cam face where one pair of washers is placed between bolt head and structural component to be connected and another pair of washers is placed between nut and structural component to be connected. The radial teeth press into the surfaces during tightening leading to a form fit. Hence in a case of unintentional loosening only the single washers of the pair can turn against each other what will be prevented since the cam angle is larger than the thread pitch in any case. To ensure the securing effect of the Nord-Lock washers the hardness of the structural components shall not be higher than the hardness of the securing washers themselves (44HRC). Annex A 1 contains examples of Nord-Lock washers and a therewith executed connection.

2 Specification of the intended use in accordance with the applicable EAD 331565-00-0602

Nord-Lock washer are intended to be used instead of regular washer for bolts made of carbon steel with strength 4.6 up to including 10.9 or bolts made of stainless steel with strength 70 up to including 80.

The securing effect is only guaranteed if requirements for execution according to Annex C 1 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 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 to B 5
Harness of washer	see Annex A 1
Preloading	No performance assessed
Securing effect	see Annex C 1

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+

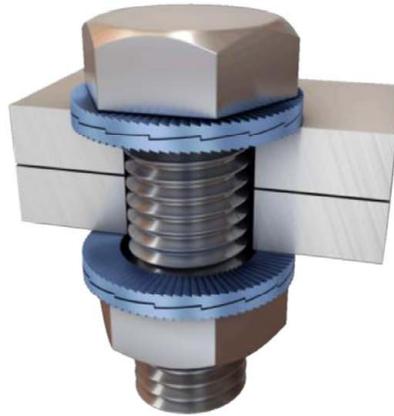
5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

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

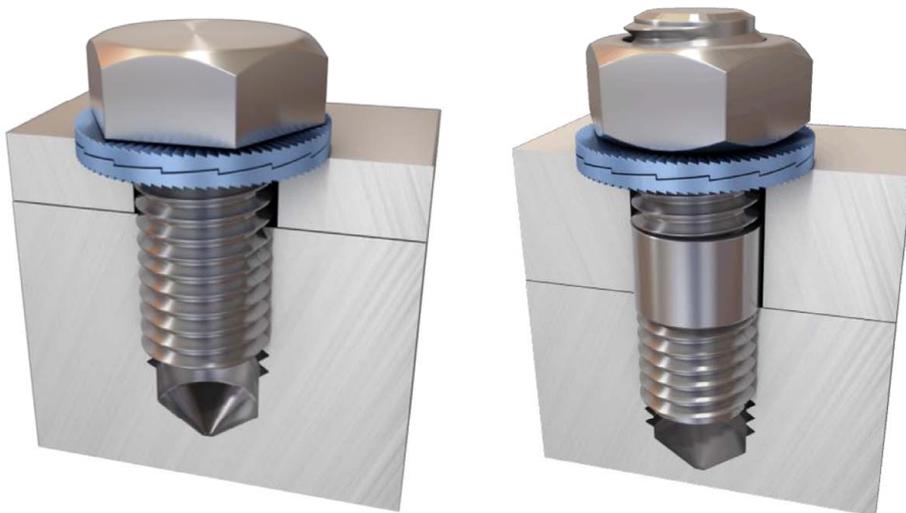
Issued in Berlin on 9 October 2020 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Hahn



Schematic diagram of a steel construction connection with a bolting assembly with two Nord-Lock washers



Schematic diagram of blind hole connections with one Nord-Lock washer each

Table A1 Series, available nominal diameter, material

Series	Nominal diameter	Material	Material number	CRC ¹⁾	Hardness	Remark
NL	M6 to M48	Carbon steel	1.7182	---	470 – 610 HV1	2)
NLss	M6 to M48	Stainless steel	1.4404	III		
NLss-254	M6 to M39	Stainless steel	1.4547	V		
NLsp	M6 to M36	Carbon steel	1.7182	---		2)
NLspss	M6 to M30	Stainless steel	1.4404	III		
NLspss-254	M6 to M27	Stainless steel	1.4547	V		
NLSC	M12 to M36	Carbon steel	1.7182	---		2)

1) Corrosion Resistance Class according to EN 1993-1-4
2) These Nord-Lock washers are supplied with a zinc flake coating with a dry layer thickness of approx. 8 µm and an inorganic cover coating of approx. 2 µm

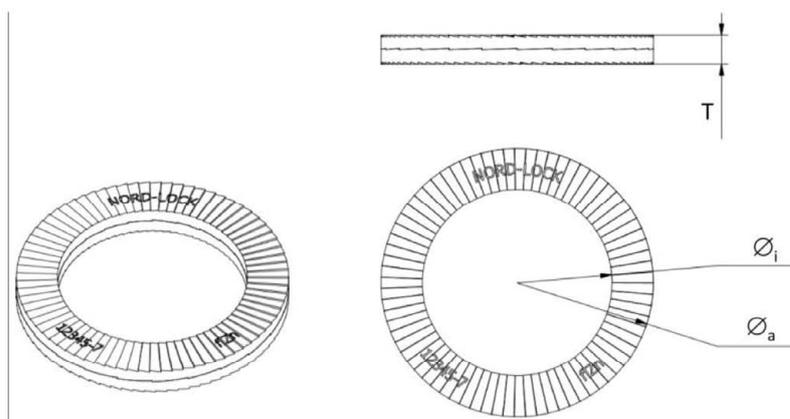
Nord-Lock washers for non-preloaded structural bolted connections

Schematic diagrams of possible bolted connection with Nord-Lock washers, series with allocation of the available nominal diameters and materials, range of application of the Nord-Lock washers

Annex A 1

Table B1 Main dimensions of Nord-Lock NL washers

Washer dimensions	Nominal diameters of bolts	\varnothing_i [mm]	\varnothing_a [mm]	T [mm]
NL6	M6	6.5	10.8	1.8
NL8	M8	8.7	13.5	2.5
NL10	M10	10.7	16.6	2.5
NL12	M12	13.0	19.5	2.5
NL14	M14	15.2	23.0	3.4
NL16	M16	17.0	25.4	3.4
NL18	M18	19.5	29.0	3.4
NL20	M20	21.4	30.7	3.4
NL22	M22	23.4	34.5	3.4
NL24	M24	25.3	39.0	3.4
NL27	M27	28.4	42.0	5.8
NL30	M30	31.4	47.0	5.8
NL33	M33	34.4	48.5	5.8
NL36	M36	37.4	55.0	6.6
NL39	M39	40.4	58.5	6.6
NL42	M42	43.2	63.0	6.6
NL45	M45	46.2	70.0	7.0
NL48	M48	49.6	75.0	7.0



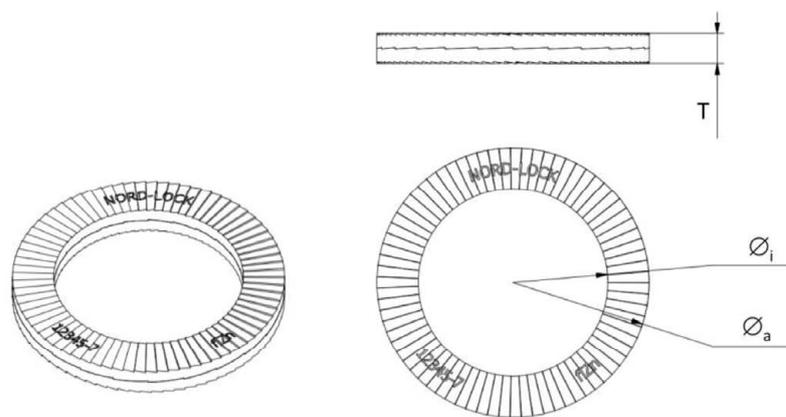
Nord-Lock washers for non-preloaded structural bolted connections

Main dimensions of Nord-Lock NL-washers

Annex B 1

Table B2 Main dimensions of Nord-Lock NLss and NLss-254 washers

Washer dimensions		Nominal diameters of bolts	\varnothing_i [mm]	\varnothing_a [mm]	T [mm]
NLss	NLss-254				
NL6ss	NL6ss-254	M6	6.5	10.8	2.2
NL8ss	NL8ss-254	M8	8.7	13.5	2.0
NL10ss	NL10ss-254	M10	10.7	16.6	2.0
NL12ss	NL12ss-254	M12	13.0	19.5	2.0
NL14ss	NL14ss-254	M14	15.2	23.0	3.0
NL16ss	NL16ss-254	M16	17.0	25.4	3.0
NL18ss	NL18ss-254	M18	19.5	29.0	3.2
NL20ss	NL20ss-254	M20	21.4	30.7	3.0
NL22ss	NL22ss-254	M22	23.4	34.5	3.2
NL24ss	NL24ss-254	M24	25.3	39.0	3.2
NL27ss	NL27ss-254	M27	28.4	42.0	6.8
NL30ss	NL30ss-254	M30	31.4	47.0	6.8
NL33ss	NL33ss-254	M33	34.4	48.5	6.8
NL36ss	NL36ss-254	M36	37.4	55.0	6.8
NL39ss	NL39ss-254	M39	40.4	58.5	6.8
NL42ss	---	M42	43.2	63.0	6.8
NL45ss	---	M45	46.2	70.0	6.8
NL48ss	---	M48	49.6	75.0	6.8



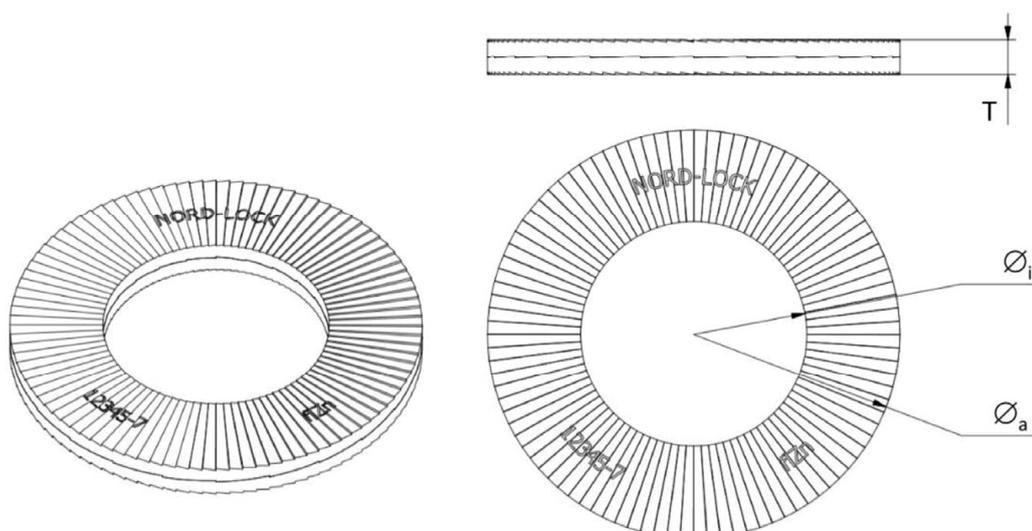
Nord-Lock washers for non-preloaded structural bolted connections

Main dimensions of Nord-Lock NLss and NLss-254 washers

Annex B 2

Table B3 Main dimensions of Nord-Lock NLsp washers

Washer dimensions	Nominal diameters of bolts	\varnothing_i [mm]	\varnothing_a [mm]	T [mm]
NL6sp	M6	6.5	13.5	2.5
NL8sp	M8	8.7	16.6	2.5
NL10sp	M10	10.7	21.0	2.5
NL12sp	M12	13.0	25.4	3.4
NL14sp	M14	15.2	30.7	3.4
NL16sp	M16	17.0	30.7	3.4
NL18sp	M18	19.5	34.5	3.4
NL20sp	M20	21.4	39.0	3.4
NL22sp	M22	23.4	42.0	4.6
NL24sp	M24	25.3	48.5	4.6
NL27sp	M27	28.4	48.5	5.8
NL30sp	M30	31.4	58.5	6.6
NL33sp	M33	34.4	58.5	6.6
NL36sp	M36	37.4	63.0	6.6



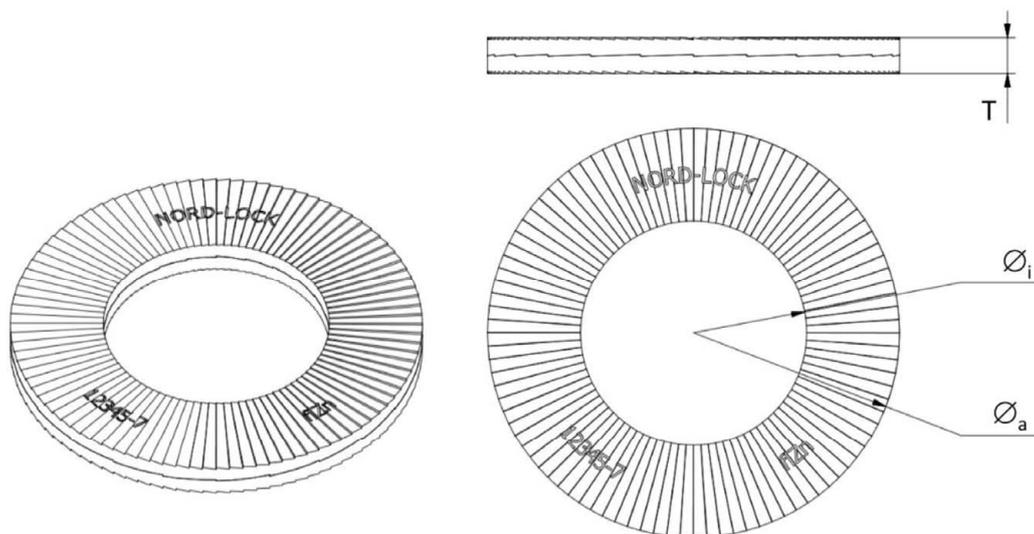
Nord-Lock washers for non-preloaded structural bolted connections

Main dimensions of Nord-Lock NLsp washers

Annex B 3

Table B4 Main dimensions of Nord-Lock NLspss and NLspss-254 washers

Washer dimensions		Nominal diameters of bolts	Øi [mm]	Øa [mm]	T [mm]
NLspss	NLspss-254				
NL6spss	NL6spss-254	M6	6.5	13.5	2.0
NL8spss	NL8spss-254	M8	8.7	16.6	2.0
NL10spss	NL10spss-254	M10	10.7	21.0	2.0
NL12spss	NL12spss-254	M12	13.0	25.4	3.0
NL14spss	NL14spss-254	M14	15.2	30.7	3.2
NL16spss	NL16spss-254	M16	17.0	30.7	3.2
NL18spss	NL18spss-254	M18	19.5	34.5	3.2
NL20spss	NL20spss-254	M20	21.4	39.0	3.2
NL22spss	NL22spss-254	M22	23.4	42.0	3.2
NL24spss	NL24spss-254	M24	25.3	48.5	3.2
NL27spss	NL27spss-254	M27	28.4	48.5	6.8
NL30spss	---	M30	31.4	58.5	6.8



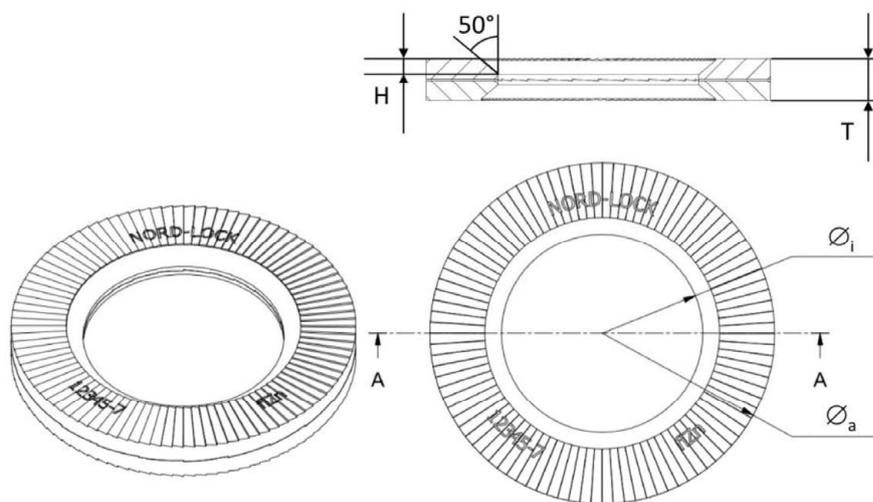
Nord-Lock washers for non-preloaded structural bolted connections

Main dimensions of Nord-Lock NLspss and NLspss-254 washers

Annex B 4

Table B5 Main dimensions of Nord-Lock NLSC washers

NLSC	Nominal diameters of bolts	\varnothing_i [mm]	\varnothing_a [mm]	T [mm]	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
NL27SC	M27	28.4	49.5	5.8	1.8
NL30SC	M30	31.4	55.4	5.8	1.8
NL36SC	M36	37.4	65.4	6.0	1.6



Nord-Lock washers for non-preloaded structural bolted connections

Main dimensions of Nord-Lock NLSC washers

Annex B 5

Table C1 Torque moments in Nm for achieving the securing effect for NL, NLss, NLss-254, NLsp, NLspss, NLspss-254 and NLSC Nord-Lock washers

Nominal diameter ¹⁾	Bolts and nuts made of carbon steel				Bolts and nuts made of stainless steel	
	Strength class				Strength class	
	4.6	5.6	8.8	10.9	70	80
M6	3	3	8	11	5	7
M8	7	9	20	28	14	18
M10	14	18	37	55	27	35
M12	24	30	65	95	47	60
M14	42	45	115	165	70	100
M16	62	75	165	230	115	150
M18	90	100	250	355	150	210
M20	120	150	320	450	220	290
M22	160	200	430	610	295	410
M24	210	260	550	780	390	510
M27	300	360	800	1100	560	750
M30	410	510	1100	1500	750	1000
M33	560	670	1400	2100	1000	1300
M36	720	850	1900	2700	1300	1700
M39	1000	1100	2750	3900	2000	2700
M42	1300	1350	3500	4800	2600	3500
M45	1600	1650	4200	6000	3200	4200
M48	1950	2330	5200	7400	3900	5200

¹⁾ the nominal diameters available for the individual series according to Table A1 shall be observed

For the design of bolted connections with Nord-Lock washers, EN 1993-1-3 or EN 1993-1-8 apply, depending on the component thicknesses to be connected, in each case in conjunction with the National Annex.

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

It should be noted that each Nord-Lock washer consists of two individual washers bonded together. Nord-Lock washers where this bonding has already been loosened before assembly may no longer be used.

The components to be connected shall lie directly on top of each other. Any gaps between the components shall be closed after tightening the screws. The screw axis shall be perpendicular to the component surface. Any inclinations shall be compensated by suitable wedge washers.

In order to achieve the securing effect with the bolted connections, the tightening torques according to table C1 shall be used.

Nord-Lock washers for non-preloaded structural bolted connections

Torque moments in Nm for achieving the securing effect for NL, NLss, NLss-254, NLsp, NLspss, NLspss-254 and NLSC Nord-Lock washers

Annex C 1