



HEICO-LOCK®

WEDGE LOCKING SYSTEMS

HEICO-LOCK® PRODUCT OVERVIEW

EFFECTIVE SECURING ELEMENTS

HEICO-LOCK® Wedge Locking Systems – high quality anti-vibration security for the most demanding of bolted joint applications!

HEICO-LOCK® WEDGE LOCK WASHERS

The proven locking system for the most demanding of bolted joint applications.

> [page 06](#)

HEICO-LOCK® RING LOCK WASHERS

The innovative system with added security.

> [page 08](#)

HEICO-LOCK® WEDGE LOCK NUTS

Combined. Efficient. Safe!

> [page 10](#)

HEICO-LOCK® COMBI-WASHERS

Flexible. Fast. Innovative.

> [page 12](#)

HEICO-LOCK® HLK-WASHERS FOR STEEL CONSTRUCTION

The anti-vibration bolt securing system for HV sets.

> [page 14](#)

THE TASK: TO SECURE!

Bolted connections tend to work themselves loose under certain operating conditions. Vibrations cause particular problems as they can overpower the “self-locking effect” of bolted connections. This can lead to functional failure or even to the connection coming apart. As it's not always possible to know what forces are acting on the structure, and as constructional measures cannot be implemented everywhere, securing elements are often used.

However, certain securing elements no longer comply with state-of-the-art technology and are ineffective in modern,

weight and cost-optimised structures using high-tensile bolts and nuts. The corresponding standards have been withdrawn by the German Institute for Standardisation (DIN). A few others have been downgraded to the rank of bolt retainers as they do not prevent self-loosening but do stop the connection from falling apart.

Effective securing elements maintain a high pre-load force, reliably supporting the function even under extreme operating conditions.

One of the few effective securing technologies available is the HEICO-LOCK® Wedge Locking Systems, the effectiveness of which has been demonstrated by the latest experimental standards (including DIN 65151, DIN 25201-4, NASM 1312-7).

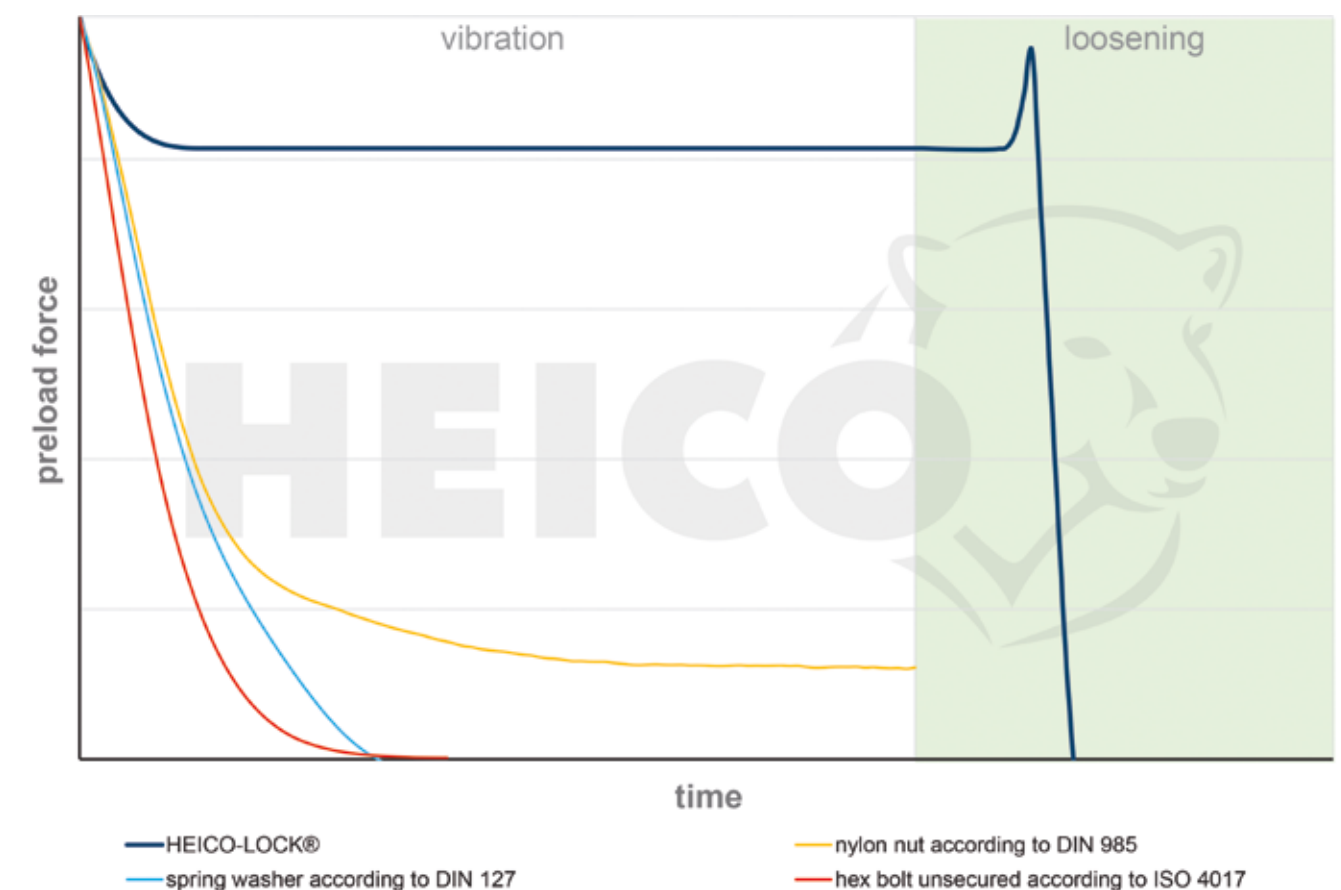


Chart: The process of preload force loss as demonstrated by vibration testing to DIN 65151 / DIN 25201-4

HEICO-LOCK® WEDGE LOCKING SYSTEM

THE HEICO-LOCK® WEDGE LOCKING SYSTEM

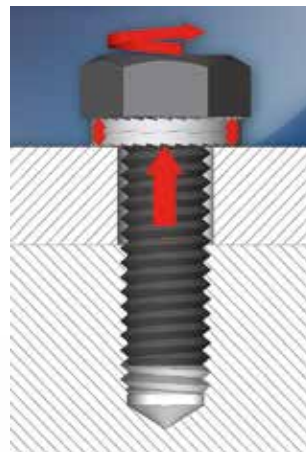
Even under extremes of vibration or dynamic loads, the HEICO-LOCK® Wedge Locking System provides maximum reliability. When the bolt is tightened, the external radial teeth of the HEICO-LOCK® Wedge Locking System embed themselves in an interlocking fashion with the respective mating surface.

If the securing system is subject to dynamic stress, movement is only possible between the internal washer surfaces. This results in an increase in the clamping force.

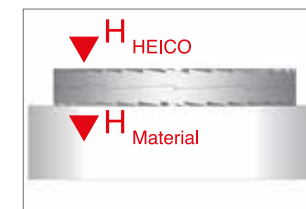
FUNCTIONAL PRINCIPLE

An important feature of HEICO-LOCK® Wedge Locking System, setting it apart from other systems that are available, is the securing of the bolt fastening using preload force rather than friction

- Wedge-shaped cams on the inside of the lock washers, radial teeth on the outside
- Interlocking embedding of the radial teeth with the respective mating surface (when tightening the bolted joint)
- System movement only possible between the inner wedge shaped cams. Movement across these wedge shaped surfaces effectively self locks the bolt.
- Increase in clamping force

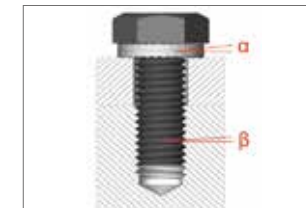


TECHNICAL DATA



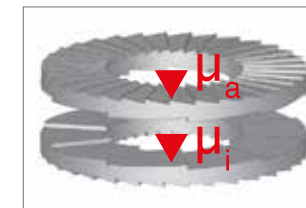
1. Difference in hardness: $H_{HEICO} > H_{Material}$

- The surface hardness of HEICO-LOCK® Wedge Lock Washers is greater than that of structural grade and high tensile bolts (e.g. strength classes: 8.8, 10.9, 12.9)
Steel (through-hardened, zinc flake coated) 485 ±25 HV0.3
Stainless steel (surface-hardened) > 520 HV0.05



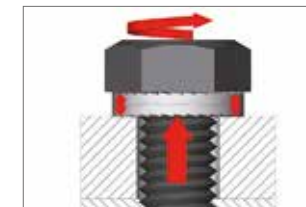
2. Difference in angles: $\alpha > \beta$

- The wedge angle (α) between the HEICO-LOCK® Wedge Lock Washers is greater than the pitch (β) of the bolt thread
- This angle means the expansion in thickness of the HEICO-LOCK® Wedge Lock Washers is greater than the possible longitudinal movement of the bolt along the thread



3. Difference in friction: $\mu_a > \mu_i$

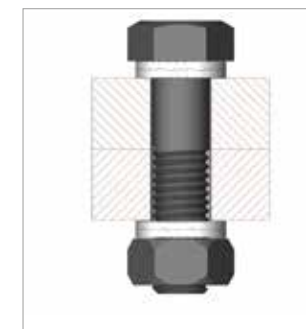
- The wedge-shaped surfaces have a considerably lower friction coefficient μ_i than the toothed outside of the washers (friction coefficient μ_a)
- Loosening caused by dynamic stresses causes movement between the two washers in the region of the wedged surfaces



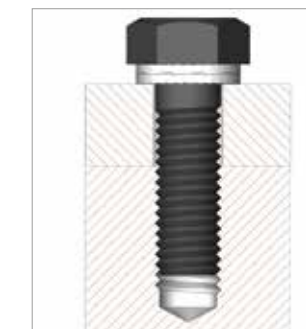
4. Difference in preload: $F_{dyn} > F_{stat}$

- An expansion in thickness of the HEICO-LOCK® Wedge Lock Washers as a result of loosening leads to an increase in the clamping force
- This causes an increase in the preload compared to when in a static state and thus causes the bolt to self-lock

INSTALLATION EXAMPLES



Hexagon bolt in a through-hole, secured on both sides



Hexagon bolt secured in a blind hole



Countersunk socket head bolt secured in position



No locking function when combined with flat and freely rotating washers

HEICO-LOCK® WEDGE LOCK WASHERS

THE PROVEN LOCKING SYSTEM FOR THE MOST DEMANDING OF BOLTED JOINT APPLICATIONS.

The self-loosening of bolted joints is one of the most commonly occurring failure modes in the operation of machines and systems. HEICO-LOCK® Wedge Lock Washers prevent loosening of the bolted joint by providing a safe and reliable bolt securing system - even for extremes of vibration or dynamic loads.

- Certified system for securing bolts, working at low and high preload levels
- Particularly suitable for dynamic loads – including when using lubricants
- Can be re-used
- Very easy to install and remove (Wedge Lock Washers are supplied as a pre-assembled pair)
- Also suitable for high-tensile bolts of 8.8, 10.9 and 12.9 and their respective nuts
- Available in steel or stainless steel with narrow or wide bearing surfaces – other materials are available upon request
- Available from M3 – M76 and ¼” – 3” - custom sizes upon request

SPECIAL MATERIALS

In addition to our HEICO-LOCK® Wedge Lock Washers made from steel [1.1191 / C45E] and stainless steel [1.4404 / 316L] we also produce our products from other special materials like 254 SMO® [1.4547] and INCONEL® / Alloy 718 [2.4668]. These special materials are resistant in highly corrosive environments (i.e. seawater or acids) with a high temperature stability. This leads to a wide variety of applications, especially within the offshore industry, energy sector, chemical industry and many more.

FIELDS OF APPLICATION



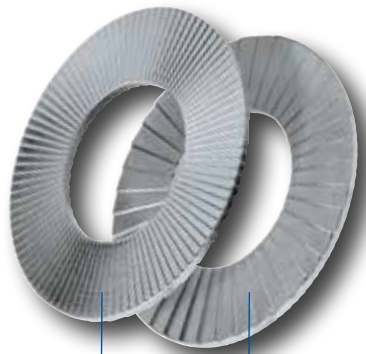
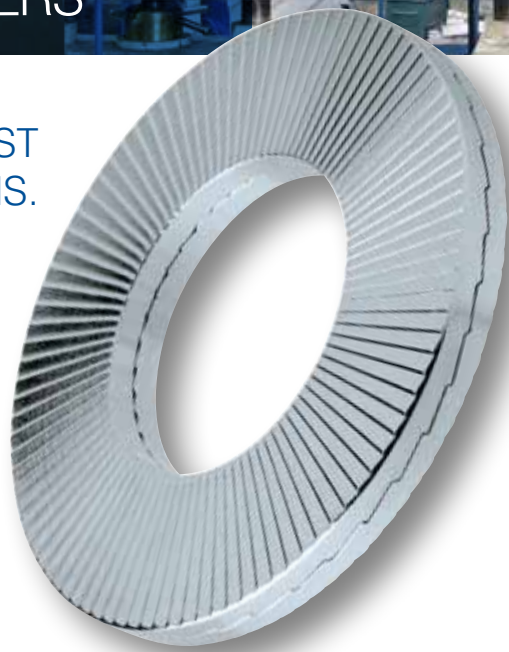
MECHANICAL ENGINEERING



OFFSHORE



AGRICULTURAL TECHNOLOGY



radial teeth wedge shaped cams

PRODUCT OVERVIEW

M	UNC	STEEL* ITEM NO.	STAINLESS STEEL* ITEM NO.	INTERNAL-Ø [MM]	EXTERNAL-Ø [MM]	BOX QTY [PAIR]
3	#5	HLS-3	HLS-3S	3,4	7,0	200
3,5	#6	HLS-3,5	HLS-3,5S	3,9	7,6	200
3,5	#6	HLB-3,5	HLB-3,5S	3,9	9,0	200
4	#8	HLS-4	HLS-4S	4,4	7,6	200
4	#8	HLB-4	HLB-4S	4,4	9,0	200
5	#10	HLS-5	HLS-5S	5,4	9,0	200
5	#10	HLB-5	HLB-5S	5,4	10,8	200
6		HLS-6	HLS-6S	6,5	10,8	200
6		HLB-6	HLB-6S	6,5	13,5	200
	1/4"	HLS-1/4"	HLS-1/4"S	7,2	11,5	200
	1/4"	HLB-1/4"	HLB-1/4"S	7,2	13,5	200
8	5/16"	HLS-8	HLS-8S	8,6	13,5	200
8	5/16"	HLB-8	HLB-8S	8,6	16,6	200
	3/8"	HLS-3/8"	HLS-3/8"S	10,3	16,0	200
	3/8"	HLB-3/8"	HLB-3/8"S	10,3	21,0	200
10		HLS-10	HLS-10S	10,7	16,6	200
10		HLB-10	HLB-10S	10,7	21,0	200
11	7/16"	HLS-11	HLS-11S	11,4	18,5	200
12		HLS-12	HLS-12S	13,0	19,5	200
12		HLB-12	HLB-12S	13,0	25,4	100
	1/2"	HLS-1/2"	HLS-1/2"S	13,5	19,5	200
	1/2"	HLB-1/2"	HLB-1/2"S	13,5	25,4	100
14	9/16"	HLS-14	HLS-14S	15,2	23,0	100
14	9/16"	HLB-14	HLB-14S	15,2	30,7	100
16	5/8"	HLS-16	HLS-16S	17,0	25,4	100
16	5/8"	HLB-16	HLB-16S	17,0	30,7	100
18		HLS-18	HLS-18S	19,5	29,0	100
18		HLB-18	HLB-18S	19,5	34,5	100
	3/4"	HLS-3/4"	HLS-3/4"S	20,0	30,7	100
	3/4"	HLB-3/4"	HLB-3/4"S	20,0	39,0	100
20		HLS-20	HLS-20S	21,4	30,7	100
20		HLB-20	HLB-20S	21,4	39,0	100
22	7/8"	HLS-22	HLS-22S	23,4	34,5	100
22	7/8"	HLB-22	HLB-22S	23,4	42,0	50
24		HLS-24	HLS-24S	25,3	39,0	100
24		HLB-24	HLB-24S	25,3	48,5	50
	1"	HLS-1"	HLS-1"S	27,9	39,0	100
	1"	HLB-1"	HLB-1"S	27,9	48,5	50
27		HLS-27	HLS-27S	28,4	42,0	50
27		HLB-27	HLB-27S	28,4	48,5	25
30	1 1/8"	HLS-30	HLS-30S	31,4	47,0	50
30	1 1/8"	HLB-30	HLB-30S	31,4	58,5	25
33	1 1/4"	HLS-33	HLS-33S	34,4	48,5	25
33	1 1/4"	HLB-33	HLB-33S	34,4	58,5	25
36	1 3/8"	HLS-36	HLS-36S	37,4	55,0	25
36	1 3/8"	HLB-36	HLB-36S	37,4	63,0	25
39	1 1/2"	HLS-39	HLS-39S	40,4	58,5	25
39	1 1/2"	HLB-39	HLB-39S	40,4	75,5	25
42		HLS-42	HLS-42S	43,2	63,0	25
45	1 3/4"	HLS-45	HLS-45S	46,2	70,0	25
48		HLS-48	HLS-48S	49,6	75,0	25
52	2"	HLS-52	HLS-52S	53,6	80,0	1
56	2 1/4"	HLS-56	HLS-56S	59,1	85,0	1
60		HLS-60	HLS-60S	63,1	90,0	1
64	2 1/2"	HLS-64	HLS-64S	67,1	95,0	1
68		HLS-68	HLS-68S	71,1	100,0	1
72		HLS-72	HLS-72S	75,1	105,0	1
76	3"	HLS-76	HLS-76S	79,1	110,0	1

* Carbon Steel, Stainless Steel A4

Non-standard sizes and special materials upon request



HEICO-LOCK® RING LOCK WASHERS

THE INNOVATIVE SYSTEM WITH ADDED SECURITY.

HEICO-LOCK® Ring Lock Washers provide high-quality, user-friendly bolt securing for the most demanding of applications and are ideal for repeated use.

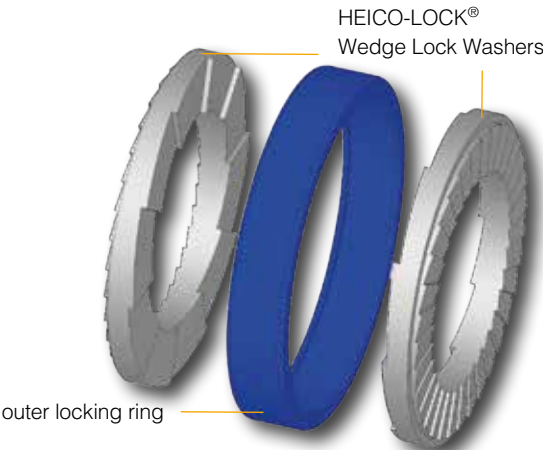
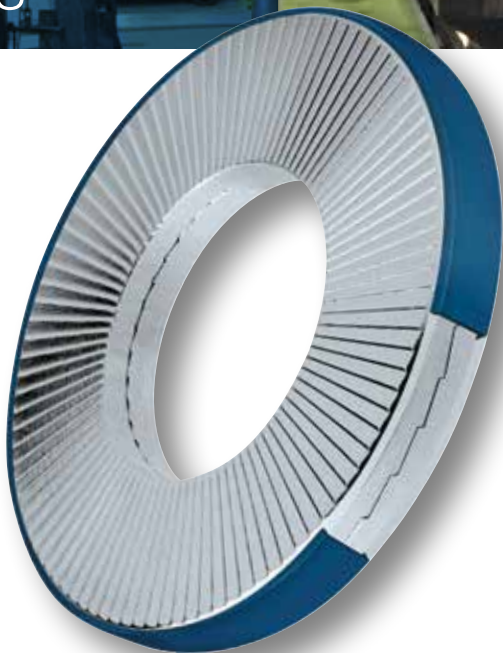
The ring locking system guarantees that the two wedge lock washers are always fastened in the correct position with the wedge shaped cams on the inside and the radial teeth on the outside. This means that the bolt locking system is always easy, safe and quick to install, even for non-specialist users.

- Very easy to install and remove (ring locking system is supplied pre-assembled)
- Whereas the HEICO-LOCK® Wedge Lock Washers secure the bolted connections reliably, the ring holds the two individual washers together in the correct position permanently
- Particularly suitable for dynamic loads – including when lubricants are used
- Also suitable for use with high-tensile bolts of 8.8, 10.9 and 12.9 and their respective nuts
- Available in steel or stainless steel with a narrow or wide bearing surface
- Available from M4 – M24 - custom sizes upon request

DESIGN OF THE RING LOCKING SYSTEM

HEICO-LOCK® Ring Lock Washers are supplied pre-assembled.

The ring locking system consists of a polyamide ring (PA) and the already familiar HEICO-LOCK® Wedge Lock Washers.



FIELDS OF APPLICATION



MAINTENANCE



MOTOR SPORTS



HEAVY INDUSTRY

PRODUCT OVERVIEW

M	UNC	STEEL* ITEM NO.	STAINLESS STEEL* ITEM NO.	INTERNAL-Ø [MM]	EXTERNAL- Ø [MM]	BOX QTY [PAIR]
M4	#8	HLRB-4	HLRB-4S	4,4	9,0	200
M5	#10	HLRS-5	HLRS-5S	5,4	9,0	200
M5	#10	HLRB-5	HLRB-5S	5,4	10,8	200
M6	-	HLRS-6	HLRS-6S	6,5	10,8	200
M6	-	HLRB-6	HLRB-6S	6,5	13,5	200
-	1/4"	HLRB-1/4"	HLRB-1/4"S	7,2	13,5	200
M8	5/16"	HLRS-8	HLRS-8S	8,6	13,5	200
M8	5/16"	HLRB-8	HLRB-8S	8,6	16,6	200
M10	-	HLRS-10	HLRS-10S	10,7	16,6	200
M10	-	HLRB-10	HLRB-10S	10,7	19,5	200
M12	-	HLRS-12	HLRS-12S	13,0	19,5	200
M12	-	HLRB-12	HLRB-12S	13,0	25,4	100
-	1/2"	HLRS-1/2"	HLRS-1/2"S	13,5	19,5	200
M14	9/16"	HLRB-14	HLRB-14S	15,2	30,7	100
M16	5/8"	HLRS-16	HLRS-16S	17,0	25,4	100
M16	5/8"	HLRB-16	HLRB-16S	17,0	30,7	100
-	3/4"	HLRS-3/4"	HLRS-3/4"S	20,0	30,7	100
-	3/4"	HLRB-3/4"	HLRB-3/4"S	20,0	39,0	100
M20	-	HLRS-20	HLRS-20S	21,4	30,7	100
M20	-	HLRB-20	HLRB-20S	21,4	39,0	100
M24	-	HLRS-24	HLRS-24S	25,3	39,0	100
-	1"	HLRS-1"	HLRS-1"S	27,9	39,0	100

* Carbon Steel, Stainless Steel A4

Non-standard sizes and special materials upon request



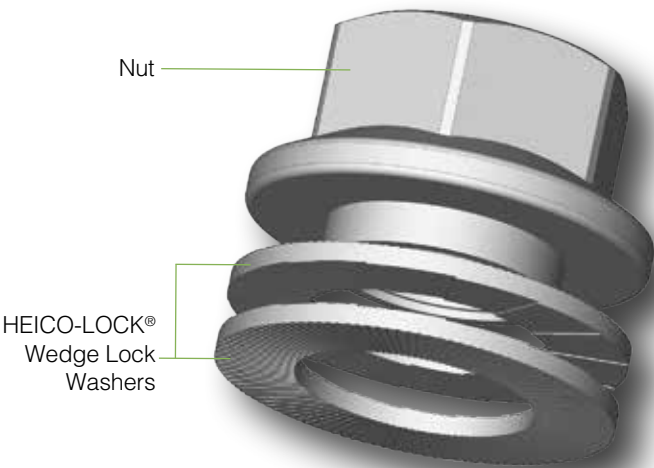
HEICO-LOCK® WHEEL NUTS

COMBINED. EFFICIENT. SAFE!

The HEICO-LOCK® Wedge Lock Nut is a re-usable one piece design that delivers high quality, user friendly bolt security without the need for separate fasteners.

The captive and rotary combination of the nut and the original HEICO-LOCK® Wedge Lock Washers makes securing your bolted joints more efficient, effective and easier even under the most extreme vibrations and dynamic loads

- The one piece design eliminates the risk of misuse
- Minimized risk of operating and production breakdowns caused by faulty bolted connections
- Easy handling especially in hard to reach locations
- Fixed permanently in the correct position
- Reduction of assembly time and effort
- Reduced complexity of the component due to less individual parts
- Easy, safe and fast installation even for non-specialist users
- Can be re-used
- Available from M6 – M27 in strength class 10
- Available with fine thread: M20x1.5 and M22x1.5



FIELDS OF APPLICATION



RAILWAY & LOGISTICS



ENERGY



CONSTRUCTION & FORESTRY MACHINES

PRODUCT OVERVIEW

M	STEEL* ITEM NO.	EXTERNAL- Ø [MM]	BOX QTY [PIECE]
6	HLM-6	14,2	100
8	HLM-8	17,9	100
10	HLM-10	21,8	50
12	HLM-12	26,0	50
14	HLM-14	29,9	30
16	HLM-16	34,5	25
18	HLM-18	38,0	20
20	HLM-20	42,8	10
22	HLM-22	46,0	10
24	HLM-24	51,0	5
27	HLM-27	56,0	5

FINE THREAD	STEEL* ITEM NO.	EXTERNAL- Ø [MM]	BOX QTY [PIECE]
20 x 1.5	HLM-20x1.5	42,8	1 / 10
22 x 1.5	HLM-22x1.5	46,5	1 / 10

* Carbon Steel

i HEICO-LOCK® WHEEL NUT



The HEICO-LOCK® Wheel Nut, a version of the wedge lock nut supplied in fine thread, is the reliable solution for the problem of self-loosening of wheel nuts on both roads and rough terrain. The captive and rotary combination of the nut and the established HEICO-LOCK® Wedge Lock Washers provides ideal protection for securing your wheels.



MORE INFORMATION: WWW.HEICO-LOCK.COM

HEICO-LOCK® COMBI-WASHERS

FLEXIBLE. FAST. INNOVATIVE.

The efficient combined securing system for highly loaded bolted connections.

HEICO-LOCK® Combi-Washers enable quick and easy assembly, especially in difficult installation situations. Combine the simple to use HEICO-LOCK® Combi-Washers with all commercially available bolts provided by your suppliers, quickly and easily.

- Easy mounting and permanent connection thanks to the inset tabs
- Can be combined with all commercially available bolts
- Also available in small purchase quantities
- Flexible use for various different types of bolts
- Permanent securing and correct positioning of HEICO-LOCK® Wedge Lock Washers
- Can be re-used several times
- Cost savings through increased productivity
- Available in steel or stainless steel with narrower and wider contact areas
- Available from M8 to M16
- Can be supplied completely pre-assembled on request



FIELDS OF APPLICATION



MANUFACTURING



ASSEMBLY



PLANT ENGINEERING

PRODUCT OVERVIEW

M	STEEL* ITEM NO.	STAINLESS STEEL* ITEM NO	EXTERNAL-Ø [MM]	BOX QTY [PAIR]
8	HKS-8	HKS-8S	14,0	200
8	HKB-8	HKB-8S	16,6	200
10	HKS-10	HKS-10S	16,9	200
10	HKB-10	HKB-10S	21,0	200
12	HKS-12	HKS-12S	19,5	200
12	HKB-12	HKB-12S	25,4	100
16	HKS-16	HKS-16S	25,4	100
16	HKB-16	HKB-16S	30,7	100

* Carbon Steel, Stainless Steel A4

Non-standard sizes and special materials upon request

TAILORED PRECISELY TO YOUR REQUIREMENTS

We supply HEICO-LOCK® Combi-Washers to meet your requirements. Fit HEICO-LOCK® Combi-Washers to your own existing bolts, quickly and easily. You can choose to carry out this step yourself or we can supply you with pre-assembled bolts ready to use.

HEICO-LOCK® Combi-Washers fit all commercially available bolts, giving you a decisive advantage as the combi product enables you to optimise your purchases through space-saving storage. Benefit from our short delivery times and attractive small purchase quantities too.



HEICO-LOCK® HLK-WASHERS

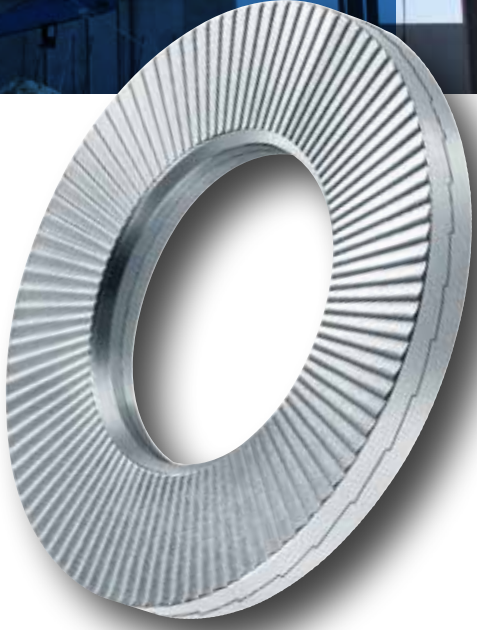
TECHNICAL SUPPORT

HLK-WASHERS FOR STEEL CONSTRUCTION

The HEICO-LOCK® HLK-Washers deliver high quality anti-vibration security for HV sets according to DIN EN 14399-4 and DIN EN 14399-8.

Even under extremes of vibration or severe dynamic loads in steel construction the HEICO-LOCK® HLK-Washers, which are approved by the German Institute for Structural Engineering (DIBt), provide maximum reliability. Due to the increased under head radius of HV bolts, the HEICO-LOCK® HLK-Washers are chamfered on the internal diameter to ensure optimal surface contact while tightening.

- Designed to secure HV sets according to DIN EN 14399-4 and DIN EN 14399-8
- Replacing washers according to DIN EN 14399-6
- Approved and certified construction product (certificate of conformity)
- Approved for use by General Building Supervisory Authority (DIBt) Approval No Z-14.4-702
- Very easy to install and remove (HLK-washers are supplied as a pre-assembled pair)
- The double chamfer also ensures that the HEICO-LOCK® HLK-Washers cannot be applied incorrectly, so avoiding operator error
- High corrosion resistance provided by use of a zinc flake coating
- Available for HV sets from M12 up to M36
- Can be used for bolted connections of cat. A to E according to DIN EN 1993-1-8, a. o. suitable for slip-resistant connections



PRODUCT OVERVIEW

M	STEEL* ITEM NO.	INTERNAL-Ø [MM]	EXTERNAL- Ø [MM]	BOX QTY [PAIR]
12	HLK-12	13	24	200
16	HLK-16	17	30	100
20	HLK-20	21	37	100
22	HLK-22	23	39	50
24	HLK-24	25	44	50
27	HLK-27	28	50	25
30	HLK-30	31	56	25
36	HLK-36	37	66	25

* Carbon Steel

FIELDS OF APPLICATION



STEEL CONSTRUCTION



BRIDGE CONSTRUCTION



SPECIAL STEEL CONSTRUCTION

HEICO

Befestigungs-
technik GmbH

Z-14.4-702

Fraunhofer
MVO08

For detailed information regarding the General Building Supervisory (DIBt) Approval No. Z-14.4-702 visit www.heico-lock.com or www.dibt.de

The HEICO group's in-house testing lab provides support in the development of new and innovative products for bolted connections. Existing products are constantly tested according to current guidelines (e.g. 25201-4, DIN EN ISO 16047), both in-house and also by independent test institutes (e.g. IMA Dresden, Fraunhofer IPA, DIBt). The test lab also offers various test options to check the use of HEICO products for customer-specific installations. By providing technical support and conducting experimental tests directly in the presence of the user, optimum safety can be ensured in individual customer applications.

TEST BENCHES AND MEASUREMENT TECHNOLOGY

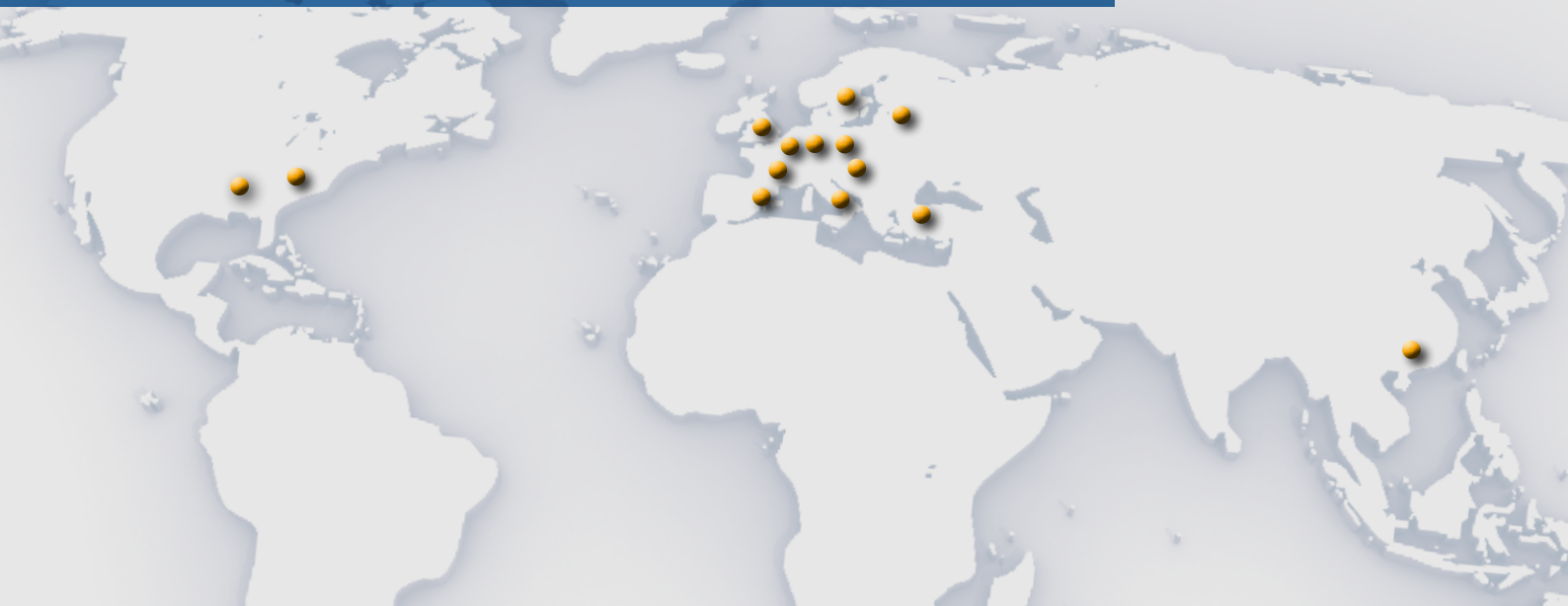
- Vibration test benches according to DIN 65151 / DIN 25201-4 (M6 to M30 / 1/4" – 1 1/8")
- Vibration test bench according to NASM 1312-7
- Torque/clamp force test bench according to DIN EN ISO 16047 (M16 to M30 / 5/8" – 1 1/8")
- Testing facility for clamp forces up to 5.000 kN
- Salt spray test chamber according to DIN EN ISO 9227
- Vickers hardness testers according to DIN EN ISO 6507-1
- Devices for measuring setting force loss
- Sample preparation devices (e.g. hardness grindings)
- Microscopic analysis devices
- Modern software for measurement data acquisition and evaluation



SERVICE OVERVIEW

- Experimental testing of locking characteristics according to DIN 25201-4 annex B, DIN 65151 and ISO 16130
- Calculation of friction coefficients e.g. according to DIN EN ISO 16047
- Research and development
- Quality control
- Customer-specific tests and test reports
- Technical support in the dimensioning of bolts according to VDI 2230 sheet 1
- Training and in-house seminars
- Lectures within the framework of expert forums (e.g. VDI Knowledge Forum, DVM)





A STRONG GROUP BEHIND A STRONG PRODUCT

The HEICO group, based in the town of Ense in Westphalia, Germany, is a family-owned business with a long tradition. The company has been working passionately in the field of fastening technology since 1900. HEICO operates internationally with multiple company sites strategically located throughout the world. The group offers the highest degree of technical support and individual testing options.

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