Desormeau

BOULONS STANDARDS ET SPÉCIALISÉS

GAMME COMPLÈTE DE GRADES ET DE FINITIONS • RAPIDITÉ DE LIVRAISON • ISO 9001
VASTE INVENTAIRE • SERVICE DE FABRICATION SUR MESURE • SYSTÈME DE TRAÇABILITÉ

Desormeau

Distributeur autorisé pour le Canada des produits innovateurs à grande valeur ajoutée

Authorized distributor for Canada of innovative products with high added value

HARDLOCK®


HARDLOCK
M24
S15C

HARDLOCK®

Register of International Marks

Self-Locking Nut

HARDLOCK NUT INTRODUCTION

FEATURES OF HARDLOCK NUT

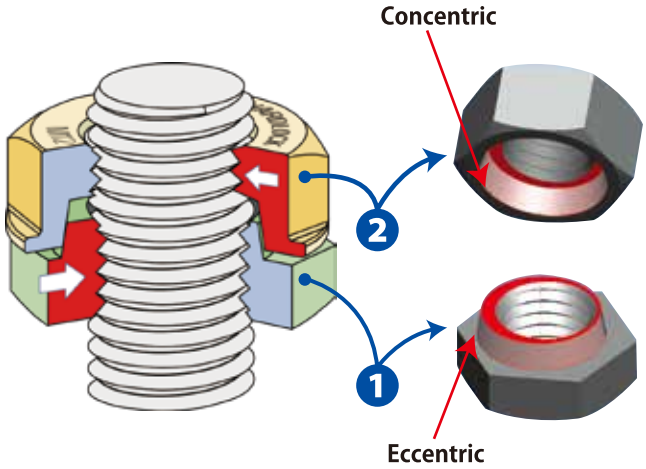
- ◆ Reusable without reduction in performance !
- ◆ Full torque management and completely fastened even with ZERO (0) clamp load !
- ◆ Available in various materials and surface treatments tailored to the environment !
- ◆ No special tools required for installation !

LOCKING MECHANISM

HARDLOCK NUT consists of two nuts, the first nut "Convex Nut" ①(clamping nut) has a truncated protrusion arranged off-center on the upper surface.

The second nut "Concave Nut" ②(locking nut) is designed with a concentric conical recess for locking the two nuts together.

By tightening the concave nut onto the convex nut, a strong perpendicular load will be applied to the bolt from both sides.

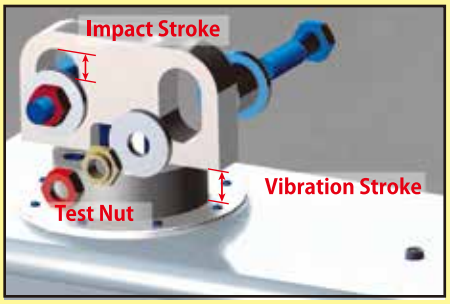


PROVED SUPERIOR IN A VARIETY OF LOOSENING TESTS

1) Accelerated vibration test conforming to NAS 3350/3354 (National Aerospace Standard)

To determine the capability of fasteners to withstand accelerated vibration condition.

Assembly of NAS testing machine



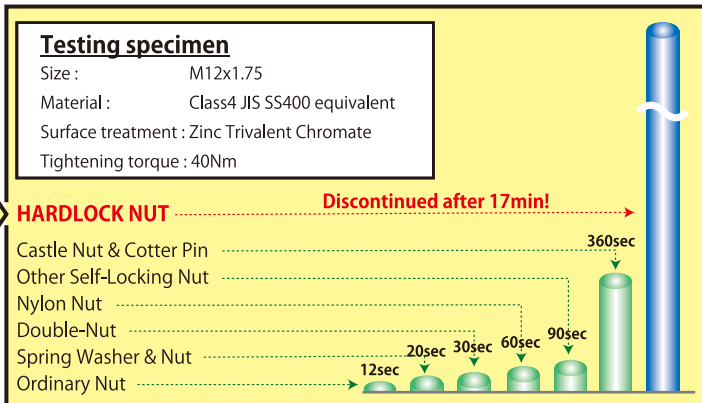
Testing conditions

Testing frequency : 1,780c.p.m
Vibration stroke : 11mm
Impact stroke : 19mm

Test results

Testing specimen

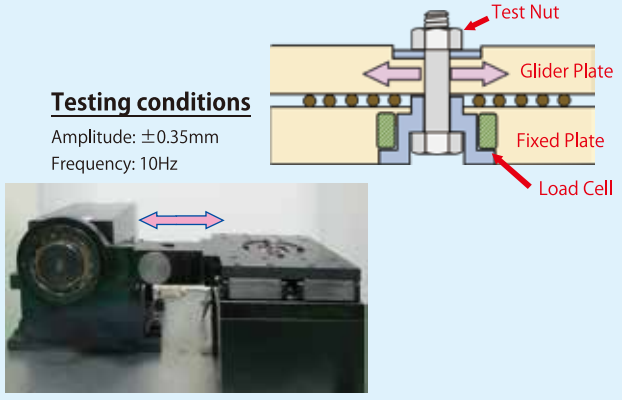
Size : M12x1.75
Material : Class4 JIS SS400 equivalent
Surface treatment : Zinc Trivalent Chromate
Tightening torque : 40Nm



2) Junker Vibration Test

The test bench applies a transverse cyclic vibration to the glider plate, and the clamp load is measured in real time and plotted on a graph.

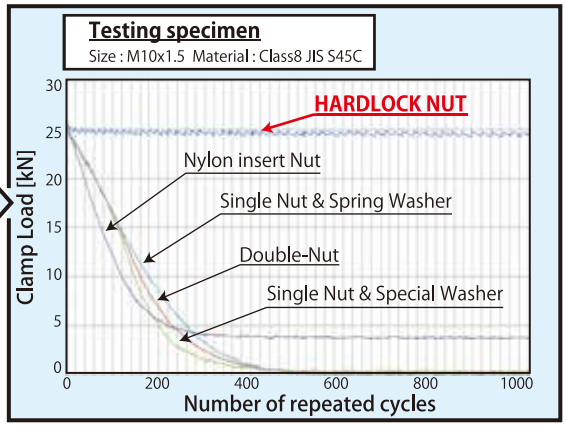
Section through of Junker test machine



Testing conditions

Amplitude: ±0.35mm
Frequency: 10Hz

Comparison of the self-loosening behavior of fasteners



CASE EXAMPLE OF COST REDUCTION

Although initial cost is higher than standard bolted connection, HARDLOCK Nut provides significant reduction in **total maintenance cost** by eliminating re-tightening work with resultant decrease in maintenance frequency and time.

Flywheel fastening for VIBRATING SCREEN (Mining company in Brazil)

Vibrating screens are used in mining industry to separate feeds containing solids and crushed rocks/ores by force of vibration generated from a flywheel, consequently always being exposed to severe vibration.

Vibrating Screen

Pendulum flywheel installed with ordinary nuts

Installed with HARDLOCK nuts

Reduction of yearly Maintenance cost (per 1 machine)

M24×3.0 C8 48 pcs / machine	Initial Cost (Rough estimate)
Ordinary Nut	US$ 57.6 US$1.2×48 pcs
HARDLOCK Nut	US$ 240 US$5×48 pcs
Cost Difference	+US$ 182.4

Maintenance Cost					
(a)	(b)	(c)	(d)=(a)×(b)×(c)	(e)	(f)=(d)×(e)
Engineers	Maintenance hours	Maintenance per year	Man-Hour per year	Labor Cost (/hour)	Maintenance Cost per year
5 (Engineers)	4 (hours)	12 (times)	240(MHRS)	US$ 20	US$ 4,800
5 (Engineers)	**1** (hour)	**1** (time)	5(MHRS)	US$ 20	US$ 100
					-US$ 4,700

Maintenance cost reduced by up to 98%

Railway joint applications (Railway company in Japan)

Two rails are bolted to join together on a track. A force as strong as 500G is applied when a train passes, this causes heavy stress on the joint as well as strain from expansion and contraction of the rail.

Installed with ordinary nuts

Installed with HARDLOCK nuts

HARDLOCK nut can produce significant locking effect even with a low torque of 250 -300Nm, compared to 500Nm for an ordinary nut. This also contributes to decrease of bolt breakage by creating a fine balance in the rail joint as if it allows the joint to "breathe" and relieves it from stress.

Reduction of yearly Maintenance cost (for 500 joints)

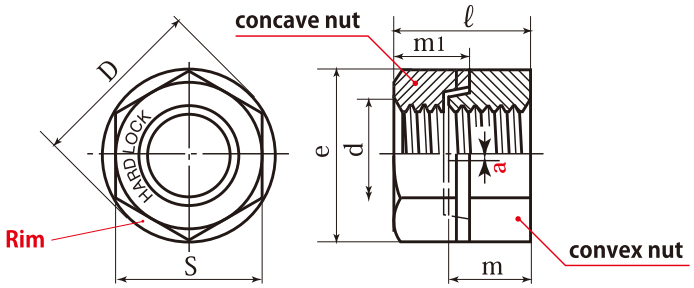
M20×2.5 C8 w/bolt & washer 500 joints×2 rails×4 sets 4,000 sets	Initial Cost (Rough estimate)
Ordinary Nut	US$ 18,000 US$4.5×4,000 pcs
HARDLOCK Nut	US$ 32,000 US$8×4,000 pcs
Cost Difference	+US$ 14,000

Maintenance Cost					
(a)	(b)	(c)=(b)×12	(d)=(a)×(c)	(e)	(f)=(d)×(e)
Engineers	Maintenance per month	Maintenance per year	Man-day per year	Labor Cost (/day)	Maintenance Cost per year
3 (Engineers)	3 (days)	36 (days)	108(man-day)	US$ 300	US$ 32,400
2 (Engineers)	**1** (day)	**12** (days)	24(man-day)	US$ 300	US$ 7,200
					-US$ 25,200

Maintenance cost reduced by up to 77%

HARDLOCK NUT DIMENSION TABLE1

HLN-R : RIM TYPE



HLN-R is our standard series with improved workability by adding a Rim to the Concave nut.

Unit : mm

Nominal size d	Thickness				Width across flats		e	Overall height ℓ	Rim dia. D	Unit weight (g)	Recommended tightening torque for the concave nut (N-m)
	Convex nut m		Concave nut m1		s						
	Basic	Tolerance	Basic	Tolerance	Basic	Tolerance	approx.	approx.	approx.	approx.	Common to all (Min - Max)
M5×0.8	4	0.1 -0.15	4	0.5 -0.2	8	0 -0.2	9.2	7.2	9.2	1.9	2 - 3
M6×1.0	5	±0.3	5	0 -0.3	10	0 -0.6	11.5	8.5	11.5	4	4 - 5
M8×1.25	6.5	0 -0.58	6.5	0 -0.58	13	0 -0.7	15.0	10.8	15.0	8.9	9 - 13
M10×1.5	8	0 -0.58	8	0 -0.58	17	0 -0.7	19.6	13.2	19.6	18	18 - 24
M12×1.75	10	0 -0.58	9.3	0 -0.58	19	0 -0.8	21.9	16.0	21.9	26	27 - 39
M16×2.0	13	±0.9	11	0 -0.7	24	0 -0.8	27.7	21.2	27.7	46	70 - 100
M20×2.5	16	±0.9	14.5	0 -0.7	30	0 -0.8	34.6	26.7	34.6	93	120 - 200
M22×2.5	18	±0.9	15.6	0 -1.2	32	0 -1	37.0	29.9	37.0	115	150 - 250
M24×3.0	19	±0.9	17.6	0 -1.2	36	0 -1	41.6	32.4	41.6	183	160 - 300
M27×3.0	21	±1.0	17.6	0 -1.2	41	0 -1	47.3	33.5	47.3	243	250 - 390
M30×3.5	23	±1.0	18.6	0 -1.2	46	0 -1	53.1	36.5	53.1	312	270 - 440

External dimensions : JIS B1181(2004) / ISO 4302(Width across flats only)
Screw thread tolerances : JIS B0209(2001) / ISO 965 6H
・In the case of HDZ, please tighten the concave nut 50% more than the above torque value due to the high torque coefficient.

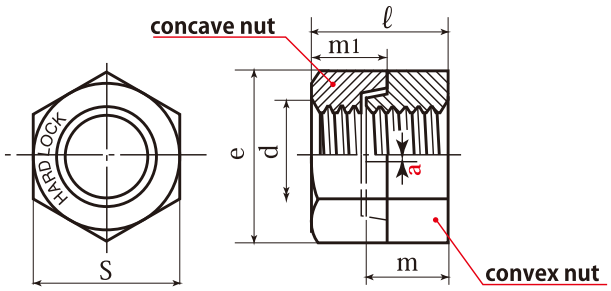
AVAILABLE STEEL GRADE :

Strength Class	Class 4		Class 8	Class 10	A2-70
Steel Grade	Low carbon steel		Medium carbon steel	Chromium Molybdenum steel	Stainless steel 304
Applicable Standard	JIS SS400 equivalent		JIS S45C	JIS SCM435	JIS SUS304 equivalent
	ASTM A563 Gr. A equivalent		ASTM A194 Gr. 2H equivalent	ASTM A194 Gr. 7 equivalent	ASTM A194 Gr. 8 equivalent
Surface finish	Zinc plating trivalent chromate	Hot Dip Galvanized (HDZ35)	Manganese Phosphate	Manganese Phosphate	—
M5×0.8	✓	—	—	—	✓
M6×1.0	✓	—	—	—	✓
M8×1.25	✓	✓	✓	✓	✓
M10×1.5	✓	✓	✓	✓	✓
M12×1.75	✓	✓	✓	✓	✓
M16×2.0	✓	✓	✓	✓	✓
M20×2.5	✓	✓	✓	✓	—
M22×2.5	✓	✓	✓	✓	—
M24×3.0	✓	✓	✓	✓	—
M27×3.0	✓	✓	✓	✓	—
M30×3.5	✓	✓	✓	✓	—

Other Materials or fine pitches are available in Basic Normal type. Other surface finishes are available upon request.
Medium carbon steel Concave nut (Rim) is used in combination with Class 10 Convex nut.

HARDLOCK NUT DIMENSION TABLE2

HLN : BASIC TYPE



HLN-B is the original series of HARDLOCK NUT.

Unit : mm

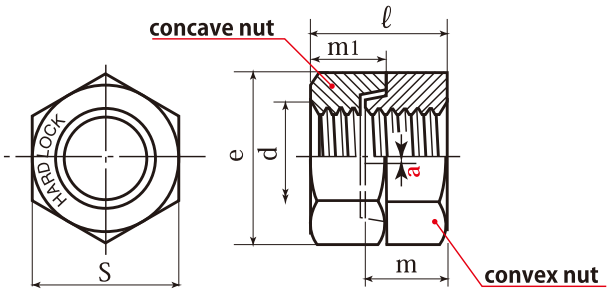
Nominal size	Pitch		Thickness				Width across flats		e	Overall height	Unit weight	Recommended tightening torque for the concave nut (N-m)
			Convex nut		Concave nut							
	p		m		m1		s			(g)		
d	Coarse	Fine	Basic	Tolerance	Basic	Tolerance	Basic	Tolerance	approx.	approx.	approx.	Common to all (Min - Max)
M6	1.0	0.75	5	±0.48	5	±0.48	10	0 -0.6	11.5	9.2	3.3	4 - 5
M8	1.25	1.0	6.5	±0.58	6.5	±0.58	13	0 -0.7	15.0	12.0	8.6	9 - 13
M10	1.5	1.25	8	±0.58	8	±0.58	17	0 -0.7	19.6	14.4	17.6	18 - 24
M12	1.75	1.25	10	±0.58	10	±0.58	19	0 -0.8	21.9	17.9	27.3	27 - 39
M14	2.0	1.5	11	±0.7	11	±0.7	22	0 -0.8	25.4	19.9	39	40 - 58
M16	2.0	1.5	13	±0.9	12	±1.0	24	0 -0.8	27.7	23.2	52.8	70 - 100
M18	2.5	1.5	15	±0.9	14	±1.0	27	0 -0.8	31.2	26.7	80	100 - 150
M20	2.5	1.5	16	±0.9	15	±1.0	30	0 -0.8	34.6	28.2	105	120 - 200
M22	2.5	1.5	18	±0.9	17	±1.0	32	0 -1	37.0	32.3	130	150 - 250
M24	3.0	2.0	19	±0.9	18	±1.0	36	0 -1	41.6	33.9	180	160 - 300
M27	3.0	2.0	21	±1.0	21	±1.0	41	0 -1	47.3	37.9	246	250 - 390
M30	3.5	2.0	23	±1.0	23	±1.0	46	0 -1	53.1	41.9	375	270 - 440
M33	3.5	2.0	25	±1.0	20	0 -1.5	50	0 -1	57.7	39.4	411	290 - 490
M36	4.0	3.0	28	±1.0	21	0 -1.5	55	0 -1	63.5	41.9	532	340 - 590
M39	4.0	3.0	30	±1.2	23	0 -1.5	60	0 -1.2	69.3	45.7	681	390 - 640
M42	4.5	4.0	33	±1.2	25	0 -1.5	65	0 -1.2	75.0	50.2	892	440 - 690
M45	4.5	4.0	35	±1.2	27	0 -1.5	70	0 -1.2	80.8	54.2	1,115	490 - 740
M48	5.0	4.0	37	±1.2	29	0 -1.5	75	0 -1.2	86.5	58.2	1,393	540 - 780
M52	5.0	4.0	41	±1.2	31	0 -1.5	80	0 -1.2	92.4	63.7	1,708	590 ~ 830
M56	5.5	4.0	44	±1.2	34	0 -1.5	85	0 -1.4	98.1	68.7	2,047	640 ~ 880
M64	6.0	4.0	50	±1.5	38	0 -1.5	95	0 -1.4	110	77.0	2,795	690 ~ 930

External dimensions : JIS B1181(2004) / ISO 4302(Width across flats only)
Screw thread tolerances : JIS B0209(2001) / ISO 965 6H

HARDLOCK NUT DIMENSION TABLE3

HLN-B : BASIC TYPE

INCH THREAD SERIES



Unit : inch

Nominal Size -Threads per inch	Convex nut		Concave nut		Width across flats		e	Overall height	Unit weight	Recommended tightening torque for the concave nut (N-m)
	m		m1		s			ℓ	(g)	
	Max.	Min.	Max.	Min.	Max.	Min.	approx.	approx.	approx.	Min - Max
1/4-20 UNC	0.226	0.212	0.226	0.212	0.438	0.428	0.488	0.390	3.3	4 - 5
5/16-18 UNC	0.273	0.258	0.273	0.258	0.500	0.489	0.557	0.457	7.9	9 - 13
3/8-16 UNC	0.337	0.320	0.337	0.320	0.562	0.551	0.628	0.559	17.6	18 - 24
7/16-14 UNC	0.385	0.365	0.385	0.365	0.688	0.675	0.768	0.638	20.8	27 - 39
1/2-13 UNC	0.448	0.427	0.448	0.427	0.750	0.736	0.840	0.752	28.1	40 - 58
5/8-11 UNC	0.559	0.515	0.559	0.515	0.938	0.922	1.051	0.972	52.8	70 - 100
3/4-10 UNC	0.665	0.597	0.665	0.597	1.125	1.088	1.240	1.165	105	120 - 200
7/8-9 UNC	0.776	0.704	0.776	0.704	1.312	1.269	1.447	1.370	130	150 - 250
1-8 UNC	0.887	0.811	0.887	0.811	1.500	1.450	1.653	1.567	246	200 - 350
1 1/8-7 UNC	0.999	0.919	0.999	0.919	1.688	1.631	1.859	1.776	310	260 - 420
1 1/4-7 UNC	1.094	1.010	0.751	0.667	1.875	1.812	2.066	1.583	324	280 - 470
1 3/8-6 UNC	1.206	1.118	0.815	0.727	2.062	1.994	2.273	1.728	436	320 - 550
1 1/2-6 UNC	1.317	1.225	0.880	0.788	2.250	2.175	2.480	1.843	551	370 - 620
1 3/4-5 UNC	1.540	1.440	1.009	0.909	2.625	2.538	2.893	2.189	896	470 - 720
2-4.5 UNC	1.763	1.655	1.138	1.030	3.000	2.900	3.306	2.433	1,363	570 - 800

Dimensions…ASME/ANSI B18.2.2 1987(R1999)
Thread Requirements…ANSI B1.1a-1968 2B

INSTALLATION PROCEDURE :

1 Use a tightening tool (spanner, torque wrench etc.) to tighten the Convex Nut to the appropriate torque for the application. The Convex Nut has the same Strength Class as a regular hexagon nut and can therefore be tightened to its maximum limit.

2 Install the Concave nut onto the Convex nut by hand until it no longer turns. Prior to tightening of the Concave nut, make sure that there is about 1 thread pitch gap between the nuts. If not, please refrain from using HARDLOCK NUT with the current bolt.
If the space is narrower than that of 1 thread pitch, the nut would be unable to demonstrate sufficient locking effect. The same conditions apply to reuse.

3 Use a torque wrench to tighten the Concave nut to the recommended torque shown in this catalog.

4 Even after tightening the nuts correctly, there is a chance that there is a small gap between the nuts due to the tolerance of bolt diameter. However, even with or without a space, if tightened correctly as instructed in this installation procedure, the HARDLOCK NUT will produce sufficient locking effect.

CASE EXAMPLE OF IMPROVEMENT

Railway〈Cars〉

Before

- In high speed rail cars, repeated impact of the rail coupling causes the nut to loosen and may even risk detachment.
- Damage to the friction ring also causes the nut to loosen.

After

- By using the HARDLOCK Nut, even under repeated impact, loosening is prevented and detachment has not occurred.
- Breakage of the friction ring is eliminated by using the HARDLOCK Nut and has been adopted by many rail car manufacturers.

Construction Equipment <Hydraulic Breaker>

Before

- Hydraulic breakers used at large mines and quarries used double nuts fastened with high torque. Severe vibration caused loosening on a daily basis.

After

- HARDLOCK Nut was used to overcome nut loosening at the appropriate tightening torque.
- The HARDLOCK Nut works with standard thread froms, and therefore no bolt specification changes were needed so the HARDLOCK Nut could be implemented quickly.

Railway <Turnout>

Before

- When a train passes, a force as large as 500G is applied to the switch, and even specially shaped double nuts used on the movable parts can become loose on a daily basis.
- While the switch (movable part) is essential to maintain the track gauge, it is extremely difficult to maintain the gauge of the track while preventing loosening.

After

- By using the HARDLOCK Nut, the maintenance cost associated with inspection and re-tightening was successfully reduced.
- The HARDLOCK Nut successfully maintained the gauge of the track and prevents loosening simultaneously. As a result, the Hardlock Nut has been adopted by all railway companies in Japan

Wind Power <Tower>

Before

- Wind turbine towers stand in areas of strong wind, due to irregular stresses caused by strong wind load, double nuts and spring washers are frequently used to prevent loosening.
- Nylon nuts are used to fasten the cable rack wiring inside the tower and the ends of the ladder, but loosening still occured, due to the micro vibrations caused by the blade rotation.

After

- By using the HARDLOCK Nut, the correct torque and bolt load could be managed at each of the fastening points.
- As a result, the frequency of routine maintenance was extended and the costs were significantly reduced.

Electrical Equipment <Switchboard Terminal Fastener>

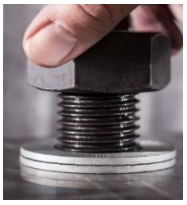
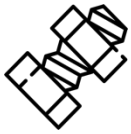
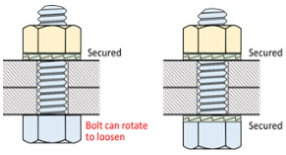
Before

- Steps to prevent loosening had been used including double nuts and the use of spring washers but vibrations during transportation and micro vibrations that occur after installation had resulted in frequent loosening.

After

- After switching to the HARDLOCK Nut, all problems related to loosening were completely solved.
- Because loosening does not occur, both the number of inspections and re-tightening work has been significantly reduced resulting in labor savings.

With HardLock Innovation,
You Find a Distinctive Solution

HARDLOCK®	≠	NORD-LOCK®
		
Excellent clamp load retention		Good clamp load retention
Can be used multiple times with consistant results		Can only be used once for consistant results
Does not interfere with base material or its finish		"Bites" into base material to insure proper grip
Can be used from 0 lbf to designed clamp load		Can only be used at designed clamp load
Installed only on the nut side of the bolt assembly		Needs to be installed on both the nut side and bolt head side to reach good vibration resistance

GENERAL TIGHTENING TORQUE FOR HEXAGON NUT

Size	Pitch	Stress Area	Strength Class			Clamp load	Tightening torque			Clamp load	Tightening torque			Clamp load	Tightening torque		
			Bolt		Nut												
				YP		YP×0.7	K=0.15	K=0.2	K=0.25	YP×0.8	K=0.15	K=0.2	K=0.25	YP×0.9	K=0.15	K=0.2	K=0.25
mm	mm	mm²		N/mm²		kN	N·m			kN	N·m			kN	N·m		
M6	1.0	20	8.8	640	Class8	9	8	11	14	10	9	12	15	12	10	14	17
			10.9	900	Class10	13	11	15	19	15	13	17	22	16	15	20	24
M8	1.25	37	8.8	640	Class8	16	20	26	33	19	22	30	37	21	25	34	42
			10.9	900	Class10	23	28	37	46	26	32	42	53	30	36	47	59
M10	1.5	58	8.8	640	Class8	26	39	52	65	30	45	59	74	33	50	67	84
			10.9	900	Class10	37	55	73	91	42	63	84	105	47	70	94	117
M12	1.75	84	8.8	640	Class8	38	68	91	113	43	78	104	130	49	87	117	146
			10.9	900	Class10	53	96	127	159	61	109	146	182	68	123	164	205
M14	2.0	115	8.8	640	Class8	52	108	144	180	59	124	165	206	66	139	185	232
			10.9	900	Class10	73	152	203	254	83	174	232	290	93	196	261	326
M16	2.0	157	8.8	640	Class8	70	169	225	281	80	193	257	322	90	217	289	362
			10.9	900	Class10	99	237	316	396	113	271	362	452	127	305	407	509
M18	2.5	192	8.8	640	Class8	86	232	310	387	98	265	354	442	111	299	398	498
			10.9	900	Class10	121	327	436	545	138	373	498	622	156	420	560	700
M20	2.5	245	8.8	640	Class8	110	329	439	549	125	376	502	627	141	423	564	706
			10.9	900	Class10	154	463	618	772	176	529	706	882	198	595	794	992
M22	2.5	303	8.8	640	Class8	136	448	597	746	155	512	682	853	175	576	768	960
			10.9	900	Class10	191	630	840	1,050	218	720	960	1,200	245	810	1,080	1,350
M24	3.0	353	8.8	640	Class8	158	569	759	949	181	651	867	1,084	203	732	976	1,220
			10.9	900	Class10	222	801	1,068	1,334	254	915	1,220	1,525	286	1,029	1,372	1,716
M27	3.0	459	8.8	640	Class8	206	833	1,110	1,388	235	952	1,269	1,586	264	1,071	1,428	1,785
			10.9	900	Class10	289	1,171	1,562	1,952	331	1,339	1,785	2,231	372	1,506	2,008	2,510
M30	3.5	561	8.8	640	Class8	251	1,131	1,508	1,885	287	1,292	1,723	2,154	323	1,454	1,939	2,424
			10.9	900	Class10	353	1,590	2,120	2,651	404	1,818	2,423	3,029	454	2,045	2,726	3,408
M33	3.5	694	8.8	640	Class8	311	1,539	2,052	2,565	355	1,759	2,345	2,931	400	1,979	2,638	3,298
			10.9	900	Class10	437	2,164	2,886	3,607	500	2,474	3,298	4,123	562	2,783	3,710	4,638
M36	4.0	817	8.8	640	Class8	366	1,976	2,635	3,294	418	2,259	3,012	3,765	471	2,541	3,388	4,235
			10.9	900	Class10	515	2,779	3,706	4,632	588	3,176	4,235	5,294	662	3,574	4,765	5,956
M39	4.0	976	8.8	640	Class8	437	2,558	3,410	4,263	500	2,923	3,898	4,872	562	3,289	4,385	5,481
			10.9	900	Class10	615	3,597	4,796	5,995	703	4,111	5,481	6,851	791	4,625	6,166	7,708
M42	4.5	1,120	8.8	640	Class8	502	3,161	4,215	5,269	573	3,612	4,817	6,021	645	4,064	5,419	6,774
			10.9	900	Class10	706	4,445	5,927	7,409	806	5,080	6,774	8,467	907	5,715	7,620	9,526
M45	4.5	1,310	8.8	640	Class8	587	3,962	5,282	6,603	671	4,527	6,036	7,545	755	5,093	6,791	8,489
			10.9	900	Class10	825	5,571	7,428	9,285	943	6,367	8,489	10,611	1,061	7,162	9,550	11,937
M48	5.0	1,470	8.8	640	Class8	659	4,742	6,323	7,903	753	5,419	7,225	9,031	847	6,096	8,129	10,161
			10.9	900	Class10	926	6,668	8,891	11,113	1,058	7,620	10,161	12,701	1,191	8,573	11,431	14,288
M52	5.0	1,760	8.8	640	Class8	789	6,150	8,200	10,251	901	7,029	9,371	11,714	1,014	7,907	10,543	13,179
			10.9	900	Class10	1,109	8,649	11,532	14,414	1,267	9,884	13,179	16,474	1,426	11,120	14,826	18,533
M56	5.5	2,030	8.8	640	Class8	909	7,639	10,185	12,732	1,039	8,731	11,641	14,552	1,169	9,822	13,096	16,370
			10.9	900	Class10	1,279	10,743	14,324	17,905	1,462	12,277	16,370	20,462	1,644	13,812	18,416	23,020
M64	6.0	2,680	8.8	640	Class8	1,201	11,526	15,368	19,210	1,372	13,173	17,564	21,955	1,544	14,819	19,759	24,699
			10.9	900	Class10	1,688	16,209	21,612	27,014	1,930	18,524	24,699	30,874	2,171	20,840	27,786	34,733

YP : Yield Point K : Torque coefficient

The tensile strength of HARDLOCK Convex nuts are completely the same as regular hexagon nuts.
Therefore,the above tightening torque value can be used when tightening the Convex nut.

HARDLOCK Industry Co., Ltd.

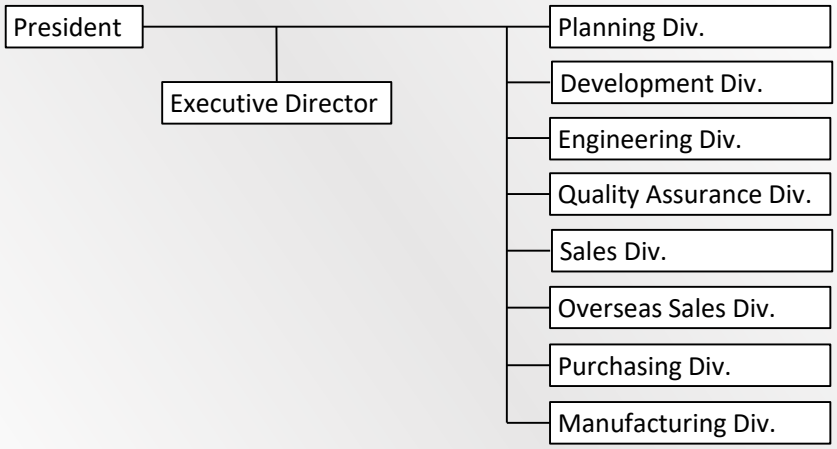
1-6-24, Kawamata, Higashi Osaka, Osaka, Japan 577-0063
TEL : +81-6-6784-1131
FAX : +81-6-6784-1161
https://www.hardlock.co.jp/en/
Email : h.office@hardlock.co.jp

Company Profile

to provide unrivaled Safety and Increased Performance

Name	HARDLOCK Industry Co., Ltd.
Established	April 1, 1974
President	Katsuhiko Wakabayashi
Business sites	
	Main Office: 1-6-24 Kawamata, Higashi-Osaka, Osaka Prefecture 577-0063
	Plants: Nos. 1 – 5 (Higashi-Osaka)
	Warehouse: Product Center (Higashi-Osaka)
	Tokyo Office: 2-5-9 Higashi-Ueno, Taito-ku, Tokyo 110-0015
	R&D Center: Rm. 302 Product Development Support Laboratory, Tokyo Metropolitan Industrial Technology Research Institute: 2-4-10 Aomi, Koto-ku, Tokyo 135-0054
Sales Turnover	2 billion JPY (FY 2017)
Overseas dealers	UK, China, Korea, Czech, Thailand, Brazil, Australia, Taiwan, other
Banks	The Bank of Tokyo-Mitsubishi UFJ, Ltd., Sumitomo Mitsui Banking Corp.
Patents and other acquired rights	50

Organization



Products

HARDLOCK Nut (HLN)	HARDLOCK Bearing Nut (HLB)	HARDLOCK Set Screw (HLS)
		
To fasten bolted joint	To set bearing axially on a shaft or on adapter sleeves	To fix a core pin for die casting die
Size Standard Rim: M5 to M30 Basic: M6 to M130 Fine Pitch threads, Thin body type Inch Series	Size M10 to M200	Size M8 to M36 Standard Normal Standard Hollow Pin Normal Pin Hollow
Material Class 4 JIS SS400 equiv. Class 8 JIS S45C Class 10 JIS SCM435 A2 JIS SUS304 (Also available in other materials)	Material Class 4 JIS SS400 equiv. Class 8 JIS S45C Class 10 JIS SCM435 A2 JIS SUS304	Material Class 8 JIS S45C Class 10 JIS SCM435

History

Make society safer and more secure with fasteners that never loosen

1974
Apr Established HARDLOCK Co. in Nagata, Joto-ku, Osaka.
1977
Mar Renamed the company HARDLOCK Co., Lid. (Capitalized at 4 million JPY)
June Opened a factory in Higashi-Osaka.
1979
Mar Began manufacturing and selling the HLB (HARDLOCK Bearing Nut).
1982
Oct Opened the Tokyo Office in Ueno, Taito-ku, Tokyo.
1990
Aug Moved the Head Office and factory to the current location.
1994
Aug Increased capital to 10 million JPY.
1996
May Moved the Tokyo Office to the current location.
1997
Apr Built a third factory on the site of the Head Office.
1998
Jan Received the R&D Award at the 15th Annual Top Executive Awards from The Nikkan Kogyo Shimbun.
Dec Received the Excellent Company Award from The Nikkan Kogyo Shimbun and the President's Award from the Higashi-Osaka Chamber of Commerce and Industry.
1991
Jun Began manufacturing and selling to limited customers the SLN (Space Lock Nut).
2000
Apr Began manufacturing and selling to limited customers the HLS (HARDLOCK Set Screw) and HL-P (HARDLOCK Pinlock Bolt).
Jul Officially registered the "HARDLOCK" trademark (Reg. No. 4402041).
Oct Built a fourth factory on the site of the Head Office.
Dec Created a Trading Dept.
2001
May Obtained approval from Railtrack of the UK for the HARDLOCK Nut to be used with railway signals (Authorization No. PA05/867).
2002
May Began manufacturing and selling to limited customers the SLB (Space Lock Bearing Nut).

2003
Jan HARDLOCK Nut was selected for the Good Design Award. It was the first-ever product in the industry to receive the award.
Mar HARDLOCK Nut was adopted for Taiwan's Rapid Transit System.
Oct HARDLOCK Nut was required for use in specific locations by Network Rail of the UK (Authorization No. PA05/2077).
Nov Acquired ISO9001-2000 certification from TUV of Germany.
Dec Obtained certification to use the HARDLOCK Nut from Queensland Rail, Australia. (Certificate No. C0054)
2005
Jul Self-locking effect of the HARDLOCK Nut was announced in a research paper at the ASME PVP2005 Conference held in Denver, Colorado (USA).
2006
Dec Effectiveness of the self-locking effect of the HARDLOCK Nut was introduced in a documentary on train accidents by the BBC (UK), leading to wider-spread use in the railway industry.
2007
Mar Selected for a Silver Medal at the 9th Higashi-Osaka Manufacturing Awards.
Nov Listed amongst the Top Small Japanese Business Known Worldwide by Newsweek magazine.
2008
Apr Given top scores in delivery, quality and price by Etesia of France.
May Rated top level in loosening tests conducted by the China Academy of Machinery Science and Technology
Jun Expanded the Head Office Factory.
Jul Obtained approval for the HARDLOCK Nut to be used with railway cars by Pesa of Poland. HARDLOCK Nut was adopted for use on the ATR220 for Trenitalia of Italy.

2009
Apr Named amongst the 300 Most Active Small Manufacturing Business by The Small and Medium Enterprise Agency
Jun Named amongst the Top 100 Manufacturing Businesses in the Kansai by the Kinki Bureau of Economy, Trade and Industry.
Jul Selected for Special Recognition at the 3rd Monozukuri Nippon Grand Awards by the Prime Minister's Office.
Nov Honored with The Order of the Rising Sun, Gold and Silver Rays at the Autumn Commendations by the Emperor Heisei.
2010
Jan Hosted Masayuki Naoshima, Minister of Economy, Trade and Industry, and his delegation for a factory tour.
Mar Received the Invention Award at the 35th Invention Awards from the Japan Society for the Advancement of Inventions and Nikkan Kogyo Shimbun.
2011
Mar President Wakabayashi's "The Screw That Never Comes Loose: How a Small Company Became a Global Player" was published and simultaneously released in China, Korea, Taiwan and elsewhere.
Oct Hosted Motohisa Furukawa, Minister of State for National Policy, for a tour of small businesses.
Nov Received the Japan Innovators Award at the 10th Japan Innovators Awards from Nikkei Business Publications.
2012
June … President Wakabayashi delivered a special address for the 60th anniversary of his alma mater, the Osaka Institute of Technology.
July … Hosted Win Myint, Myanmar Minister of Commerce, and his delegation of 25 persons for a tour of exemplar small businesses in Japan. Also, hosted Masajuro Shiokawa, former Minister of Finance.
Aug. … President Wakabayashi delivered an address at the Summer Employee Seminar of the Ministry of Finance.

2013
Jan Hosted Toshimitsu Motegi, Minister of Economy, Trade and Industry, for a factory tour and opinion-sharing with President Wakabayashi.
Apr Exhibited products in the World Factory Area of The World's Best Laboratory for Everyone at Grand Front Osaka.
Jun Registered the HARDLOCK Nut in the New Technology Information System, a database of technologies used in public works projects of the Ministry of Land, Infrastructure, Transport and Tourism (Reg. No. KK-130006-A).
2014
Jul Built the Product Center to commemorate 40 years of business.
Oct Received a letter of appreciation from the President of JR Tokai for contributions to safety, as a part of commemorative activities marking 50 years of service of the Tokai Shinkansen.
2015
Apr Received the Kuninomiya Higashi Memorial Award from the Kuninomiya Higashi Society.
Jun Received the Cool Japan Award from the Cool Japan Association.
Nov Received the Kuninomiya Higashi Culture Award from the Kuninomiya Higashi Society.
2016
Jul Registered the "HARDLOCK" trademark in China.
2017
May Launched joint research into self-locking fasteners for the medical field in cohort with the Tokyo Metropolitan Industrial Technology Research Institute.
Sep Obtained approval to use the HARDLOCK Nut with fishplates from Network Rail of the UK, leading to use all across the UK.
Dec Launched development of ultra-small HARDLOCK Nuts for the aerospace and medical fields. Built a fifth factory on the site of the Head Office. Conferred HARDLOCK Industry President's Awards to recipients at the WW Idea Competition of the Kuninomiya Higashi Society.
2018
Jan Registered the "HARDLOCK" trademark in Korea.

Customers

Building bonds between people, between things, between everything

<Japan>

<Railway infrastructure & rolling stock>
JR, private railways, subways
Kawasaki Heavy Industries
Nippon Sharyo
Hitachi
Kinki Sharyo
Japan Transport Engineering

<Transportation equipment>
Toyota Motor
Nissan Motor
Honda Motor
Mitsubishi Motors
Isuzu Motors
Suzuki Motor
Fuji Heavy Industries
Hino Motors
Yamaha Motor
Nippon Fruehauf
Nippon Trex
TCM
Aichi
Kyokuto Kaihatsu Kogyo

<Electric power and gas>
Tokyo Electric Power
Tohoku Electric Power
Chubu Electric Power
Hokuriku Electric Power
Kansai Electric Power
Kyushu Electric Power
Shikoku Electric Power
Chugoku Electric Power
Okinawa Electric Power
Hokkaido Electric Power
Tokyo Gas
Osaka Gas

<Nuclear power generation>
Fukushima Daiichi NPP 1 - 6
Fukushima Daini NPP 1, 3
Kashiwazakikariwa NPP 1 - 7
Onagawa NPP 1 - 3
Higashidori NPP 1
Hamaoka NPP 1 - 5
Oi PP
Takahama PP
Shika NPP
Tsuruga PP
Mihama PPSpent Nuclear Fuel Reprocessing Plant
Tokai Daini PP
Shimane NPP
Ikata PP
Genkai NPP
Sendai NPP
Oarai R&D Institute
Monju NPP
Fugen NPP
Ningyotoge Environmental Engineering Center
Toki Office, NIFS
Ako Office, Spring-8
JNF Rokkasho Reprocessing Plant
QST Naka Fusion Institute

<Pylons>
NTT/NTT Docomo
KDDI
Civil Aviation Bureau
Defense Facilities Administration Bureau
National Police Agency
Railway related Municipalities
ULVAC

<Cement>
Taiheiyo Cement
Ube-Mitsubishi Cement
Sumitomo-Osaka Cement
<Amusement>
Universal Studios Japan
Kompan Playscape

<Industrial equipment>
Kubota
Yanmar
Ebara
Fanuc
Nissei Plastic Industrial
Sumitomo Heavy Industries
Toshiba Machine
Japan Steel Works
Brother Industries
Torishima Pump Manufacturing
DMG Mori
Fujifim
Ulvac

<Aluminum sashes>
Nippon Light Metal
Sumitomo Light Metal Industries
Tostem
YKK AP
Shinnikkei
Sankyo Tateyama
Fuji Sash
<Construction>
Kajima
Taisei
Obayashi
Shimizu
Takenaka

<Electric equipment>
Mitsubishi Electric
Toshiba
Fuji Electric
Panasonic
Meidensha
Hitachi

<Shipyards and plants>
Mitsubishi Heavy Industries
Hitachi Zosen
Mitsui E&S
Kawasaki Heavy Industries
Ishikawa-Harima Heavy Industries
Sumitomo Heavy Industries
Tsukishima Kikai
Hitachi Construction Machinery
Komatsu
Kobelco Construction Machinery
Tadano
Ube Machinery
Sakai Heavy Industries

<Steel>
Nippon Steel & Sumitomo Metal
JFE Steel
Kobe Steel

<Construction>
Kajima
Taisei
Obayashi
Shimizu
Takenaka

<Overseas>

[Korea]
Samsung Heavy Industries
Hyundai Heavy Industries
Posco (Steel)
Hyundai Motor
GM-Daewoo
KIA Motor
Hyundai Rotem (Rolling stock)
Korea Railroad
Woojin (AGT)
Samsung Electronics
Hanwah Techwin
Ulvac Korea
Incheon Bridge
Korea Electric Power

[India]
ASB International (Injection molding equipment)
Suzuki Powertrain
Vita Technology (Valves)
Sesa Goa Iron Ore

[Thailand]
BLCP Power (Hydroelectric power generation)

[Malaysia]
Gempita Engineering (Valves and pumps)

[Philippines]
Coral Bay Nickel

[China]
China Railway High-Speed
Hong Kong Metro
Guangzhou Metro
Bao Steel

[Taiwan]
Taiwan Rapid Transit System
China Steel
Formosa Plastics
Taiwan Railways Administration
Dragon Steel

[Singapore]
SMRT (Subway)
New Transit System

[Pakistan]
Bestway (Cement)

[UEA]
Dubai New Transit

[Maldives]
Huawei Marine

[Australia]
Bycyrus (Mining equipment)
Hydrapower Pty.Ltd.
Queensland Rail (Railway)
Westinghouse Rail Systems
Vossloh Cogifer (Rail infrastructure)

[Sweden]
Atlas Copco
Volvo
Dynapac

[Austria]
Hoerbger (Valves)
Plasser & Theurer (Railway infrastructure)

[Germany]
Siemens

[USA]
Cooper Crane & Rigging
Arcelor Mittal U.S.A.
John Deere
IHI Press
GE Energy
New York Metro

[Mexico]
Nissan Automotive parts

[Brazil]
Vale S.A
Arcelor Mittal
Metos
Sao Marco
Andritz

[UK]
Network Rail
London Underground
Balfour Beatty
Unipart Rail
SPX Rail
Westinghouse Rail System
Morrison (Police Masts)
Kee Process (Sewage tanks)
Abacus Lighting (Mobile phone masts)

[France]
Etesia (Lawnmowers)
Vossloh Cogifer (Railway Point)

[Poland]
Pesa (Rolling stock)

[Italy]
Ferrari

[Switzerland]
ABB AS (Robotics)