



FS All-Steel Lock-Nut



Flaig + Hommel

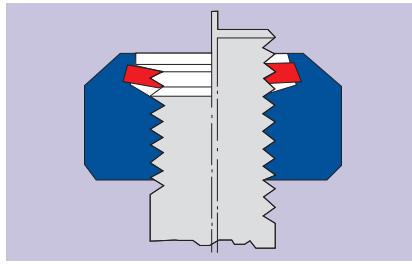
FS All-Steel Lock-Nut:

Competent reliability even under extreme pressure!

Fastening problems with dynamically highly stressed threaded joints have led to the development of the FS all-steel lock-nut. It has a flexible and completely threaded locking element which is fitted into the nut body.

As opposed to competitors' lock-nuts, the FS all-steel lock-nut can be used universally. This is due to the fact that the design combines all elements required for a safe threaded connection, such as re-usability, heat resistance, corrosion resistance, protection of the counter thread and narrow tolerance of the locking torque.

The FS all-steel lock-nut can be reused many times without significant loss of its locking capability and exceeds, **after 15 times of tightening and loosening of the nuts, the values given in DIN EN ISO 2320.**



BASIC ADVANTAGES

- The FS all-steel lock-nut offers double-safety. The locking element works both in radial and axial direction. Thus the locking effect remains fully operational even after repeated unfastening of the FS lock-nut.
- The FS all-steel lock-nut locking element, which is offset but otherwise conforming to standard thread sizes, prevents the counter thread from being damaged.
- Economical storage due to universal use.



ASSEMBLY ADVANTAGES

- Cost- and space-effective automated assembly instead of castellated nuts, split pins, counter nuts, etc.

High heat resistance up to 1000 °C



Examples of application:

INDUSTRIAL AREAS		COMPONENTS	ATTACHING
1. automotive industries	1.1	engine exhaust	high temperature area of the exhaust system
	1.2	turbo charger	turbo to engine manifold
	1.3	wind shield (bottom area)	chassis
	1.4	heat shield (engine cover)	engine compartment
2. automotive supply industries	2.1	retarder-hydraulic brake system	installation in vehicle
	2.2	heat exchanger of retarder brake	heat exchanger / hydraulic-brake
	2.3	servo-hydraulic pump	secure mounting of the toothed gear on the shaft
	2.4	exhaust system catalytic converter	weld nuts for repairing and replacement of components
	2.5	shock absorbers	piston rod to chassis
3. chassis and special automotive engineering applications	3.1	pneumatic cushion units	to the axle
	3.2	turn table of hydraulic jib trucks	to the chassis
	3.3	stationary wheel-support (between turnable and axle)	length adjustment of the wheel support
4. process plant and machinery, building industry	4.1	high-speed milling machine 18 000 rpm-shock breaked	the milling tool and the drive shaft
	4.2	plate valves of reciprocating compressor	spring steel pressure valve
	4.3	abrasion plate attaching (hot rolling mill)	in areas of the furnace
	4.4	liquid filters (aggressive chemicals)	filter components and inserts



TECHNICAL ADVANTAGES

- The clamping force is adjustable during manufacturing within fine tolerances.
- **The FS all-steel lock-nut can withstand temperatures up to 1000 °C. For use within temperatures in excess of 300 °C, suitable heat resistant materials are being employed depending on the application.**
- High axial loads are granted as threads are manufactured to DIN EN ISO 2320 standards.
- **The nut measurements** meet the requirements of the standards DIN EN ISO 7042 / DIN EN ISO 10512, DIN 6925, DIN 980 M and DIN 6927 / DIN EN ISO 1667 / DIN EN ISO 1664 (flange nuts).
Special designs with **reduced height** are available. Please talk to our engineers.

Flaig + Hommel is recognized, worldwide, as a manufacturer of the FS-all-steel-locknuts and, since the 1950s, as a reliable and innovative partner of the automotive and rolling stock industries.

BENEFITS

- Reliable even in difficult screwed connections such as used in turbochargers, exhaust manifolds, catalysts, highly stressed gearboxes, superchargers and vibrating machine components.
- The FS all-steel lock-nut has proven itself over many years and has created a host of new possibilities to crack old problems (new solutions to old problems).
- The FS All-Steel Lock-Nut are resistant to high temperatures and corrosion due to F+H's use of modern technologies, resulting in better reliability than galvanizing. These techniques have been accomplished without inducing hydrogen embrittlement.



Quality Control Certificates may be down loaded from our website at „<http://www.flraig-hommel.de/en/company/quality/index.html>“.

Technical Facts:

Property class: 04, 05, 8, 10, 12

Special materials:

Highly heat resistant materials:

1.7218	25CrMo4	KG
1.7225	42CrMo4	GC
1.7709	21CrMoV5-7	GA
1.4923	X22CrMoV12-1	V (VH)
1.4980	X6NiCrTiMoVB25-15-2	SD

Rostfreie Stähle:

A2-70, A2-80, A4-70, A4-80, 1.4571

Surface coatings: galvanized surfaces according to DIN EN ISO 4042
Dacromet, Delta-Ton, Zinc-Iron
Zinc-Nickel, hot-dip galvanization etc.

Threads: Metric: standard- and fine threads. Imperial: standard- and fine threads. All other threads available on request.

All other designs, materials and dimensions are available upon request.

**Approved by the
German Railway System
Deutsche Bahn AG
in BN 205 107-1
and StW 508.51.022.**

INDUSTRIAL AREAS		COMPONENTS	ATTACHING
5. Rolling Stock Industries Railway locomotives and rolling stock equipment German Railway System Deutsche Bahn AG in BN 205 107-1 and StW 508.51.022	5.1	bogies	fixing off all components (brakes, etc.)
	5.2	engine suspension	on the frame (chassis)
	5.3	braking system	disk brakes, brake cylinders and frames
	5.4	rubber/steel mounting blocks	on the steel wheels
	5.5	wheel shock and noise absorber	
6. magnetic hover train	6.1	stator and rotor	to the train
	6.2	magnetic packages	and track
7. lifting equipment	7.1	steering swivel (fork trucks)	attaching and adjusting of the wheel bearings
	7.2	hoist equipment	attaching of the fixing hook bolt
8. ship and boat construction	8.1	propeller	propeller to the propeller shaft

TECHNICAL DATA

Design acc. to:

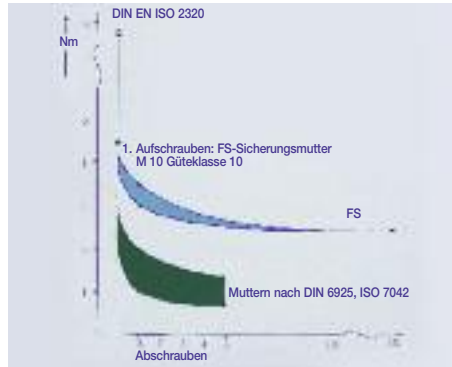
DIN EN ISO 7042, DIN EN 1664,
DIN EN 1667, DIN 980, DIN 6925 (old type)

Mechanical properties:

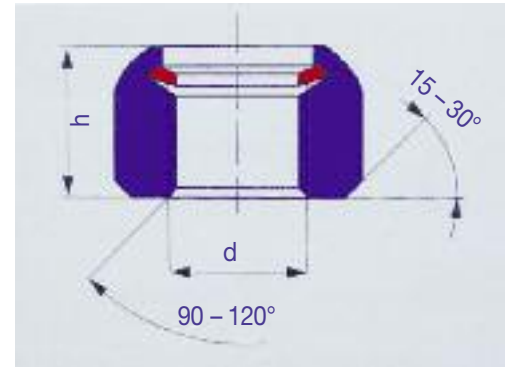
DIN EN ISO 2320 (DIN EN 20898-2/
DIN EN ISO 898-6)

Surface coatings:

DIN EN ISO 4042 – galvanic surface coatings (also Cr 6-free), Delta-Tone, Zinc-Iron, Zinc-Nickel, Hot Dip galvanized, Geomet, Delta-Protect, QPQ, Phosphate, Dacromet, etc.



Prevailing torques



Design

(metric) mm				Prevailing torque (Nm)		
d	h	s	e	1st application max.	1st unscrewing min.	15th unscrewing min.
M 5	5	8	8,79	1,6	0,29	0,2
M 6	6	10	11,05	3,0	0,45	0,3
M 8	8	13	14,38	6,0	0,85	0,6
M 10	10	16	17,77	8,0	1,5	1,0
M 10	10	17	18,90	8,0	1,5	1,0
M 12	12	18	20,03	12,0	2,3	1,6
M 12	12	19	21,10	12,0	2,3	1,6
M 14	14	21	23,36	16,0	3,3	2,3
M 14	14	22	24,49	16,0	3,3	2,3
M 16	16	24	26,75	25,0	4,5	3,0
M 18	18	27	29,56	28,0	6,0	4,2
M 20	20	30	32,95	30,0	7,5	5,3
M 22	22	32	35,72	40,0	9,5	6,5
M 24	24	36	39,55	45,0	11,5	8,0
M 27	27	41	45,63	50,0	13,5	10,0
M 30	30	46	50,85	60,0	16,0	12,0
M 33	33	50	55,37	70,0	18,0	14,0
M 36	36	55	60,79	75,0	21,0	16,0
M 39	39	60	66,44	90,0	23,0	18,0
M 42	42	65	72,61	100,0	30,0	20,0
M 48	48	75	83,91	130,0	40,0	25,0
M 56	56	85	95,07	160,0	50,0	30,0
M 64	64	95	106,37	200,0	60,0	35,0

(imperial) inch				Prevailing torque (ft./lb.)		
d	h	s	e	1st application max.	1st unscrewing min.	15th unscrewing min.
1/4	7/32	7/16	.488	3,0	0,3	0,1
5/16	17/64	1/2	.557	6,0	0,8	0,6
3/8	21/64	9/16	.628	8,0	1,5	1,0
7/16	3/8	11/16	.768	9,0	2,0	1,5
1/2	7/16	3/4	.840	12,0	3,0	2,0
9/16	31/64	7/8	.982	16,0	4,0	2,5
5/8	35/64	15/16	1.051	25,0	5,0	3,0
3/4	41/64	1 1/8	1.240	28,0	7,0	5,0
7/8	3/4	1 1/8	1.447	30,0	9,0	7,0
1	55/64	1 1/2	1.653	45,0	14,0	10,0
1 1/8	31/32	1 11/16	1.859	50,0	16,0	12,0
1 1/4	1 1/16	1 7/8	2.066	60,0	19,0	14,0
1 3/8	1 11/64	2 1/16	2.273	68,0	24,0	16,0
1 1/2	1 1/32	2 1/4	2.480	75,0	30,0	18,0
1 5/8	1.556	2 9/16	2.828	88,0	35,0	23,0
1 3/4	1.679	2 3/4	3.035	100,0	40,0	27,0
1 7/8	1.802	2 15/16	3.242	120,0	44,0	28,0
2	1.925	3 1/8	3.449	130,0	48,0	30,0

Prevailing Torques: The adjusted prevailing torques are valid for bolts class 6g zinc plated. After the 5th loosening, the prevailing torque remains constant. Deviations from these values may occur as a result of different surface coatings.

Recommended tightening torques (Nm) valid for μ ges. 0,12; 90% yield stress utilization $R_{p0,2}$								μ ges. 0,1
Property class	8	10	12	Property class: Fine thread	8	10	12	A2/A4 - 70
M 5	6	9	10					4
M 6	10	16	18					7
M 8	25	38	45	M 8 x 1	27	39	46	17
M 10	50	75	86	M 10 x 1,25	53	78	89	34
M 12	86	128	150	M 12 x 1,5	92	132	155	55
M 16	215	315	365	M 16 x 1,5	218	330	385	130
M 20	430	605	705	M 20 x 1,5	470	660	770	235
M 24	735	1040	1215	M 24 x 2	790	1120	1305	420
M 30	1450	2060	2410	M 30 x 2	1590	2245	2625	
M 36	2520	3570	4170	M 36 x 2	2755	3915	4580	

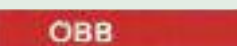
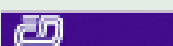
The stated locking torques signify an ideal-typical connection and don't necessarily apply to an actual screwed connection.

Calculation verification necessary! (VDI 2230-2003)

FS Lock-nuts made of austenitic steels may be employed without the use of a lubricant. They are plated with a specific surface coating that prevents the nuts from pitting onto the screws. This coating has been approved by the DB AG.

Important note: Fast and without interruption tighten the screw with a screw driver at no more than 20-30 RPM. An impact screw driver is hereby not ideal.

References:



FS All-Steel Lock-Nuts Cold Heading Special Parts CNC Turned Parts