Thread Locking and Sealing

Integrated Locking Features – Integrated Safety

BOSSARD

Integrated thread locking

High locking-effect

Integrated Thread Locking

Thread locking is an integrated part of the fastener. It can neither be lost nor forgotten.

Cost-efficient Thread Locking

There is no need for additional locking elements such as lock washers, adhesives, etc. As a result, material management is simplified.

Reliable Thread Locking

Thread locking patches and adhesives are pre-applied using sophisticated equipment. Strict requirements and testing assure consistent quality.

Clean Thread Locking

Thread locking patches do not harm the surface of the assembled components. They do not cause corrosion.

Versatile Thread Locking

Nylon patches, as well as locking adhesives, can be used for sealing and thread locking, under head sealing, friction enhancement, thread protection, and much more.

TufLok® – «The Blue Patch»®

Product Description

TufLok® is a reliable and cost-efficient system for thread locking and thread sealing fastened joints. A highly elastic, wear-resistant, blue nylon patch is applied at a specific portion of the thread. The play between external and internal thread is eliminated, making the joint vibration resistant.

The nylon patched fasteners meet torque performance requirements as defined in works standard (WN900.1, see table). Torque performance requirements may also be specified per DIN 267 – part 28 or customer requirements. The tests are conducted using test nuts or components provided by the customer. Experiential values are available for adjusting screws.

Product Features

- High locking effectiveness
- Suitable for adjusting screws
- Seals against liquids and gases
- Can be reused several times
- No curing time, can be used immediately
- For all metals
- For almost every type of surface
- Unlimited shelf life
- Resistant to many chemicals

Design Guideline for Patches

Basic principle:

- For locking use TufLok®-Patch (nylon patches)
- For sealing use TufLok®-Patch360 (patched 360°)
- Free threads on thread end enable easy installation
- 2-3 threads underneath the head should not be patched
- Internal thread must have a chamfer or else the patch could peal off when the screw is installed

Range

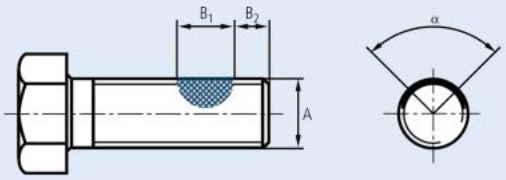
Assembly-ready, self-locking screws and threaded parts:

- screws from M1 to M8
- lengths up to 220 mm
- nuts from M5 to M12

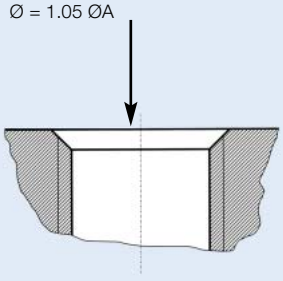
Typical Patch Dimensions

- Patch coverage angle α in the core area ~90°
- Edge zone (spray transition) up to ~180°
- Length B1 ~4 to 6 threads
- Length B2 ~1 to 2 threads

A	thread diameter
α	Patch coverage angle
B1	patch length
B2	start of unpatched thread



Chamfer 90° – 120°,
Ø = 1.05 ØA



Torque Performance Test (WN 900.1)

1 Before testing make sure nut threads are within specified tolerances.
2 Turn the screw into the test nut (max 10 rpm's) until the patch is positioned within the nut thread. In doing so measure the maximum driving torque (see table, column I).
3 Back off the screw by 90° and then without stopping measure the smallest torque during the following 360° rotation (see table, column II)
4 Unscrew the screw fully, and then drive the screw back in again – four more times. When unscrewing the screw the fifth time, measure the smallest torque during the first 360° (see table, column III).

Torque Test (Adjusting Screws)

Test is essentially carried out the same way as for regular screws except one only has to drive parts in and out once. (See table, column IV).

Installation

- The nylon patched screws may be installed by either using manual or power tools.
- Lubricating the threads is not necessary. Oil on the threads will reduce driving torques.

Torque Performance Testing

Per works standard 900.1 **Experimental values**

Screw ISO 6g	I First on max. Nm	II First off min Nm.	III Fifth off min. Nm	IV Adjusting Screws min. to max. Nm
bis M2	0.20	0.04	0.02	
M2.5	0.30	0.06	0.03	0.02 – 0.08
M3	0.45	0.10	0.05	0.05 – 0.15
M3.5	0.70	0.20	0.10	0.10 – 0.40
M4	0.90	0.28	0.17	0.17 – 0.50
M5	1.60	0.40	0.23	0.23 – 0.70
M6	3.00	0.80	0.40	0.4 – 1.2
M8	6.00	1.50	0.80	0.8 – 2.4
M10	9.50	2.30	1.20	1.2 – 3.6
M12	13.00	3.40	1.70	1.7 – 5.1
M14	19.00	4.50	2.30	2.3 – 7.8
M16	28.00	7.00	3.50	3.5 – 10.5
M18	36.00	9.00	4.00	4.0 – 14
M20	44.00	11.00	5.50	5.5 – 17
M22	60.00	15.00	7.50	7.5 – 24
M24	80.00	20.00	10.00	10 – 30

Overview

Screws M1 to M68
Nuts M5 to M12

Products	TufLok®		Nytemp®	
Color	blue		orange	
Temperatur Range	-56°C to 120°C		-56°C to 200°C	
Patch Coating	Patch	Patch 360	Patch	Patch 360
Locking again	●●	●●●	●●	●●●
Rotational-loosening	●●	●	●●	●
Locking against	●●●	●●	●●●	●●
Adjusting Screw	●●●	●	●●●	●

Nytemp® - The «orange Patch» for High Temperature Service

The higher coating temperature means that it can only be used on plain or phosphated parts. Please contact Bossard for patched samples! Driving torques meet work standard requirements the same as TufLok® patched screws.

Precote® – Micro Encapsulated Thread Locker

Product Description

Precote® is a pre-applied locking adhesive for threaded parts. During installation, the pressure between the mating thread flanks will burst the microcapsules. The adhesive and curing agent contained in the capsules are released and mixed. The adhesive cures to produce the desired locking effect and/or a reliable seal.

The high-strength Precote® micro encapsulated adhesive meets the requirements of DIN 267 – part 27. Three different types of pre-applied adhesives are available offering prevailing torque performances that go beyond standard requirements.
Precote®-adhesive patch always covers the circumference of the thread. It typically prevents fasteners from rotating loose.

Product Features

- Very high locking effect
- Do not require dispensers
- For all metals
- For most types of surfaces
- Curing behavior independent of surface type
- Quick curing with preloaded bolted joints
- Resistant to oils, greases, hydraulic fluids and liquid coolants, fuels, salt water, etc.
- Shelf life up to 4 years

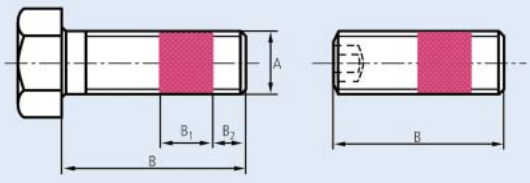
Range

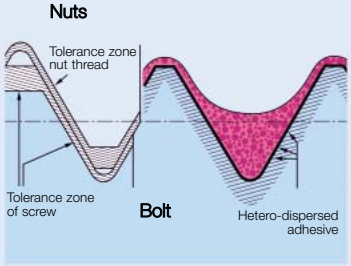
Assembly ready self-locking and sealing screws and threaded parts:

- screws from M3
- nuts from M4 to M22

Design Guideline for Adhesive Patch

- Free threads on thread end enable easy installation
- Internal thread must have a chamfer or else patch could peal off when the screw is installed (see TufLok®).





When threads are engaged, the micro capsules burst, adhesive is released, and cures quickly

Typical patch dimension

- Length B min. 10 mm
- Length B1 ca. Ø A
- Length B2 ca. 2 – 3 threads

Torque Performance Test - Preload Induced

1 Before testing, make sure nut threads are within specified tolerances.
2 Drive the screw into the test nut (max 30 rpm's) using a plain non-lubricated flat washer (DIN 125 or similar – 300 HV hardness). The test screw is tightened until the specified torque is reached (see table to the right). The patch must be positioned within the nut thread.
3 Allow adhesive to cure for 24 hours at 23°C (~ 73°F)
4 Back out the screw at 30 rpm's. In doing so, measure the loosening torque. The achieved results must not fall below the listed ratio M_{LB} / M_A (see table to the left). below the listed ratio M_{LB} / M_A under lab conditions (see table to the left).

Screw ISO 6g	Test tightening torque in Nm for screws of class (DIN 267-27) M_A [a,b] 5.6/5.8	8.8/10.9/12.9	Max. loosenig torque (DIN 267-27) in Nm	Ratio M_{LB} / M_A
M5	2.6	5.5	6.5	
M6	4.5	9.5	10	
M8	11	23	26	
M10	22	46	55	
M12	38	79	95	
M14	60	125	160	
M16	90	195	250	≥ 0,9
M18	128	280	335	
M20	176	390	500	
M22	240	530	800	
M24	310	670	1050	
M27	460	1000	1300	
M30	620	1350	1700	
M33	825	1850	2400	
M36	1100	2350	3000	
M39	1400	3000	4000	

M_A Tightening Torque
M_{LB} Breakaway Torque

a) Determined based on a total coefficient of friction $\mu_{total} \approx 0.12$ at 90 % utilization of the minimum values of the yield strength (5.6,5.8) or of the elastic limit (8.8,10.9,12.9) of the respectively lowest property class.

b) For INOX-screws according to DIN EN ISO 3506-1 and DIN 267-13, the table values for 5.6,5.8 apply.

Torque Performance Test - No Preload Induced

This test is intended for in-process control; see DIN 267, part 27

Installation

- Screws with pre-applied adhesive may be installed with manual or power tools
- Internal thread must be free of dust, oil and grease
- Please observe that preload force and any possible calibrations must be realized within a short time. Otherwise, the polymerisation structure may be damaged.

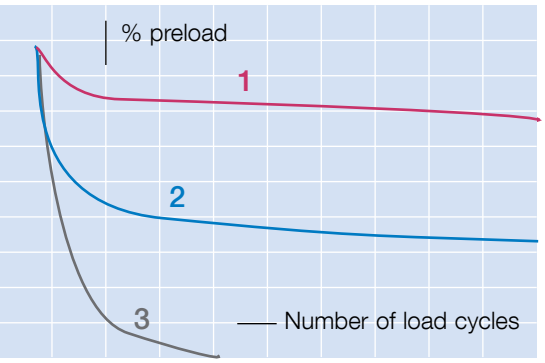
Overview

Screws from M3
Nuts from M4 to M22

Products	Precote® 30	Precote® 80	Precote® 85
Color	yellow	red	turquoise
Chemical basis	Acrylate +Peroxide	Acrylate +Peroxide	Epoxy acrylate +Peroxide
Temperature range	-50 – 150°C	-50 – 170°C	-50 – 150°C
Strength low	low	high	high
Set after approx.	15 min.	15 min.	30 min.
Functional after approx.	3 h	6 h	6 h
Cured to end strength	24 h	24 h	24 h
Thread fiction	0.10 – 0.15	> 0.25	0.10 – 0.15
Seal	up to 250 bar	up to 400 bar	up to 400 bar
Application	Especially suitable for slotted and cross recessed machine screws for the electronic and appliance industry. Often also used for sealing purposes	Universal type for all threaded parts with a high locking effectiveness. Suitable for higher temperatures, not susceptible to humidity	Especially suited to all fastened joints where consistent thread friction is needed.
Shelf life 4 years at room temperature			

Source: Manufacturers' data / DIN 267 Teil 27 – Subject to change without notice.

* All information relative to M10 ISO 4017-8.8 black oxide screws M10 ISO 4032-10 black oxide nuts value < M10 and > M10 correspond to DIN 267-27



Preload under cyclic loading

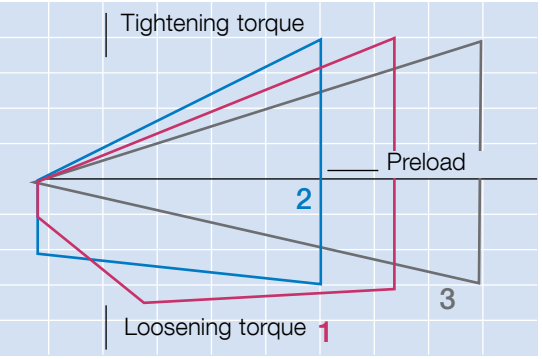
Test for Vibration Resistance

Two plates clamped with a regular screw are subjected to lateral cyclic loads (vibrations). Under this condition, screws that are not using a locking element quickly become loose.

1. Precote® coated screws
   Screws with an adhesive patch show some initial preload loss due to relaxation of the joint but then maintain a high preload. The cured, hard adhesive patch prevents slippages in the mating threads.

2. TufLok® - Nylon patched screws
   Nylon patched screws, when subjected to cyclic lateral loading, lose some of the initial preload. However, a complete unwinding is prevented with this type of locking element.

3. Screws without locking elements
   When unlocked screws are exposed to lateral vibration, the initial preload quickly drops. The screw unwinds to the point where it separates from the mating part.



Torque curve

Measuring Coefficient of Friction

When screws are tightened, the torque and the preload vary depending upon the amount of friction. With a given torque, a higher or lower friction coefficient will change the resulting preload accordingly.

1. Precote® coated screws with an adhesive patch are locked against rotational-loosening; the break-away torque may go beyond 100% of the tightening torque (high strength). The remaining adhesive in the thread generates slight friction when the screw is backed out, providing some locking against separating.

2. TufLok® nylon patched screws with a nylon patch can be loosened at around 80% of the tightening torque. During backing out, the patch generates high friction, thus preventing the mating parts from separating.

3. Screws without locking elements
   The loosening torque is about 70 to 80% of the tightening torque. When screws are backing out there is no resistance, the torque and preload drop to zero.

12/15 pdf