Thread Locking and Sealing
Integrated Locking Features – Integrated Safety
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 peel 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 $\alpha$ in the core area $\approx 90^\circ$
- Edge zone (spray transition) up to $\approx 180^\circ$
- Length B1 $\approx$ 4 to 6 threads
- Length B2 $\approx$ 1 to 2 threads
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).

Overview

<table>
<thead>
<tr>
<th>Screws</th>
<th>M1 to M68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuts</td>
<td>M5 to M12</td>
</tr>
</tbody>
</table>

Products | TuLok® | Nytemp® |

<table>
<thead>
<tr>
<th>Color</th>
<th>blue</th>
<th>orange</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range</td>
<td>-56°C to 120°C</td>
<td>-56°C to 200°C</td>
</tr>
<tr>
<td>Patch Coating</td>
<td>Patch</td>
<td>Patch 360</td>
</tr>
<tr>
<td>Locking again</td>
<td>• •</td>
<td>• •</td>
</tr>
<tr>
<td>Rotational-loosening</td>
<td>• •</td>
<td>• •</td>
</tr>
<tr>
<td>Locking against</td>
<td>• • •</td>
<td>• • •</td>
</tr>
<tr>
<td>Adjusting Screw</td>
<td>• • •</td>
<td>• • •</td>
</tr>
</tbody>
</table>

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 TuLok® patched screws.

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.
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 peel off when the screw is installed (see TufLok®).

Typical patch dimension

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

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

Source: Manufacturers’ data

| M5  | 2.6 | 5.5 | 6.5 |
| M6  | 4.5 | 9.5 | 10  |
| M8  | 9  | 23  | 26  |
| M10 | 11 | 23  | 25  |
| M12 | 17 | 39  | 50  |
| M14 | 24 | 50  | 70  |
| M16 | 27 | 60  | 80  |
| M20 | 36 | 79  | 100 |
| M24 | 50 | 110 | 140 |
| M27 | 65 | 135 | 170 |
| M30 | 82 | 165 | 210 |
| M33 | 130| 250 | 300 |
| M36 | 180| 360 | 450 |
| M39 | 240| 420 | 500 |
| M42 | 310| 600 | 750 |
| M48 | 320| 640 | 800 |

Internal thread must be free of dust, free threads on thread end enable particular tightening efforts. This test is intended for in-process control; see DIN 267, part 27.
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 head (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_{L/B} / M_A (see table to the left), below the listed ratio M_{L/B} / M_{L1} under lab conditions (see table to the left).

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

<table>
<thead>
<tr>
<th>Products</th>
<th>Precote® 30</th>
<th>Precote® 80</th>
<th>Precote® 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>yellow</td>
<td>red</td>
<td>turquoise</td>
</tr>
<tr>
<td>Chemical basis</td>
<td>Acrylate + Peroxide</td>
<td>Acrylate + Peroxide</td>
<td>Epoxy acrylate + Peroxide</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-50 – 150°C</td>
<td>-50 – 170°C</td>
<td>-50 – 150°C</td>
</tr>
<tr>
<td>Strength low</td>
<td>low</td>
<td>high</td>
<td>high</td>
</tr>
<tr>
<td>Set after approx.</td>
<td>15 min.</td>
<td>15 min.</td>
<td>30 min.</td>
</tr>
<tr>
<td>Functional after approx.</td>
<td>3 h</td>
<td>6 h</td>
<td>6 h</td>
</tr>
<tr>
<td>Cured to end strength</td>
<td>24 h</td>
<td>24 h</td>
<td>24 h</td>
</tr>
<tr>
<td>Thread friction</td>
<td>0.10 – 0.15</td>
<td>&gt; 0.25</td>
<td>0.10 – 0.15</td>
</tr>
<tr>
<td>Seal</td>
<td>up to 250 bar</td>
<td>up to 400 bar</td>
<td>up to 400 bar</td>
</tr>
</tbody>
</table>

| 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 at room temperature | 4 years at room | 3 years at room | 4 years at room |

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
Thread Locking and Sealing – Systems Comparison

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.

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.